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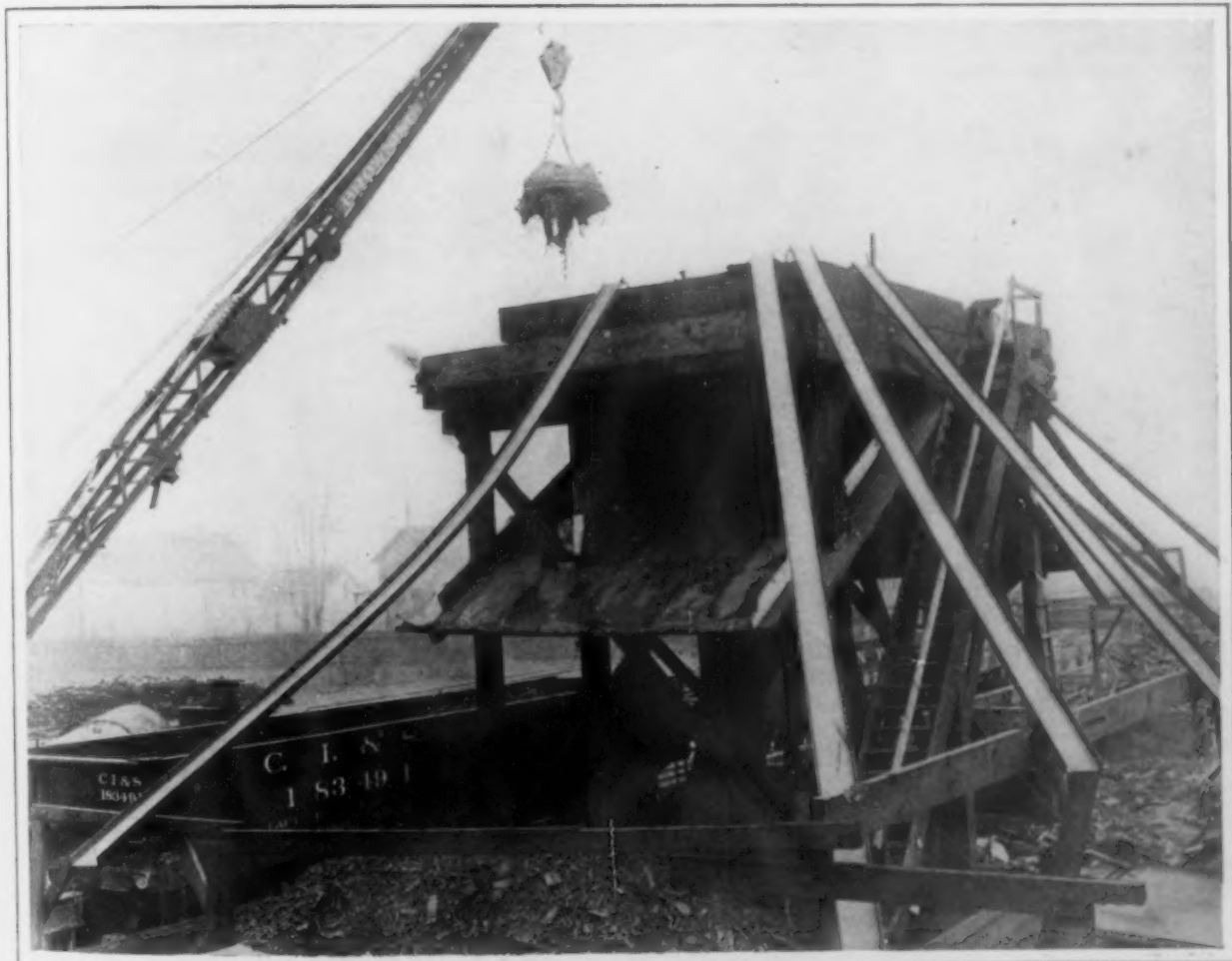
Unique Way of Handling Railroad Scrap

Gravity Distributing Dock Used by New York Central—Great Saving from Method Employed for Reclaiming Old Material

— BY F. L. PRENTISS —

THE mechanical departments of railroads have done much in the last few years in the way of cutting down costs in shops, and various new tools have been installed to increase efficiency. A great deal of money has been spent in experimenting

found their way into the scrap piles and gone to the mills and foundries for remelting. Railroad storekeepers are now alive to the situation and are working out the problems of preventing the waste that has been going on, by reclaiming castings and

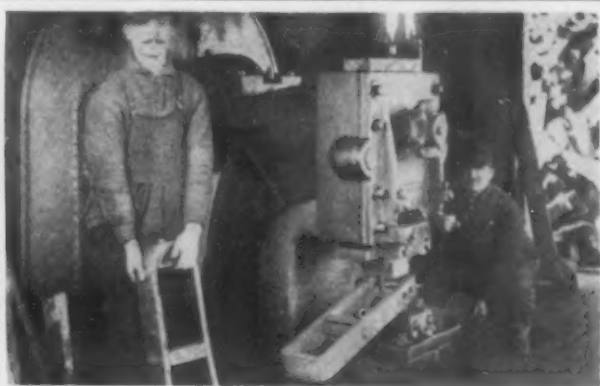


Elevated Dock for Handling and Sorting Track Scrap at the Collinwood Shops of the New York Central Railroad

on rail-laying machines and other equipment, but very little in proportion in devising better and more economical methods for taking care of the railroad scrap accumulations. Railroad officers admit that great losses have been permitted through their scrap piles by selling as scrap quantities of castings practically as good as new. In fact, in the past many entirely new parts, such as car knuckles, have

other material that can be used over again. As a part of this program along the line of economy is the providing of methods for the economical handling and reclaiming of scrap.

Quite a number of railroads are not provided with such modern labor-saving scrap-handling equipment as cranes and magnets. Some are not provided with a central scrap dock for taking care



Old and New Methods of Stripping Couplers. Formerly the Rivet Heads Were Cut Off with a Chisel and Sledge, but Now a Special Dismantling Machine Is Employed

that a shear be installed near the sorting bin or platform.

Car and locomotive scrap is dumped from the cars into four bins, where it is sorted and placed in other bins containing similar kinds of scrap. During this sorting of parts, any cast or malleable iron, cast steel, springs, etc., that the sorters think can possibly be used over is placed in a separate bin where the material is again sorted, this time by an expert sorter, and material such as castings that are still good, brake rods that can be sheared for other uses, bolts, nuts and washers are reclaimed. The sorting of this scrap is done at a piecework price of 18c. per ton.

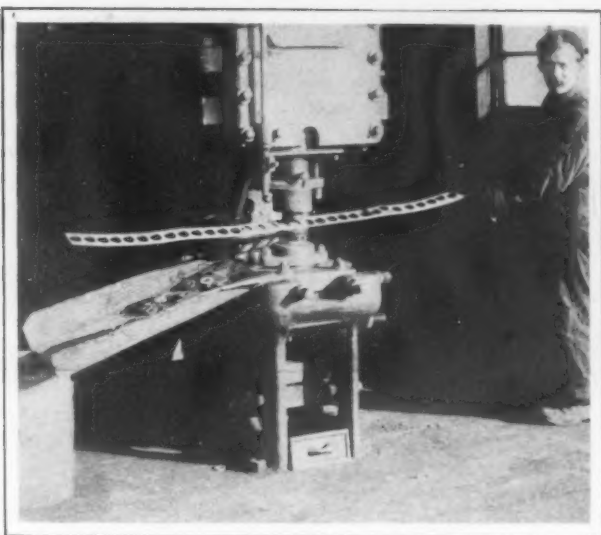
Small castings such as box door castings that are recovered in the sorting go to the reclaiming shed, where they are wired together in bundles of fifty, dip painted and placed in storage bins. Bolts and nuts are sent to the bolt shop, the former to be rethreaded and the latter to be retapped. The

couplers were formerly reclaimed by dismantling the riveted sections with a hammer and chisel. This is now done with a dismantling machine which effects a great saving in labor. This dismantling machine is a special type built by the Cleveland Punch & Shear Works Company and has fixtures for dismantling the couplers by shearing the rivets that join the coupler pocket with the coupler, doing this without injury to either the coupler pocket or the coupler. Springs that are not compressed, bolsters, knuckles and various other parts are reclaimed. The knuckles can often be made to do service some time longer by putting a steel bushing in the old coupling pin hole that has become enlarged.

Old boiler flues are used for making washers. These flues are cut into pieces 6 ft. long, flattened into strips on the machine used in dismantling the couplers and are made into washers in sizes from $\frac{5}{8}$ to $1\frac{1}{4}$ in. at a piecework price of $12\frac{1}{2}$ c. per



General View of the Scrap Yard and the Bins Into Which the Car and Locomotive Scrap Is Unloaded from the Cars as It Is Brought In. The Crane with the Lifting Magnet Plays an Important Part Here



Converting Old Boiler Flues Into Washers

100 lb. for labor for operating the washer machine. Other interesting labor reclaiming equipment includes a crude furnace built of second-hand fire-brick for recovering the solder from old car roofs, tin cans, etc. This work is done at a piecework price, one laborer recovering an average of 150 lb. per day. At the present market price of metals this laborer is earning over \$30 per day for the company. While this furnace is not kept busy every day the solder reclaimed in this way amounts to no small item in the course of a year.

From four to five carloads of reclaimed castings and other parts are shipped from the scrap reclaiming yard to the railroad repair yards every month. The remainder of the reclaimed material goes to the iron house to be shipped out as needed. The bins of sorted scrap are emptied during the night, the material being loaded on the cars for shipment to the mills with the locomotive crane and magnet, leaving the crane free for unloading purposes during the daytime.

British Control of Tungsten

Though Great Britain controls the bulk of the world's supply of tungsten ores, British high-speed steel makers obtained their tungsten almost entirely from Germany before the war. Only one British company was handling these ores, and its production of tungsten was of minor importance. To relieve the situation after war broke out, plants for the extraction of tungsten were established by the government and the supply of tungsten ore in the British colonies commandeered, insuring an adequate supply. A movement has been started to induce the government to continue the present regulations when peace is declared. Now no tungsten can be exported from Great Britain nor any ore from the colonies except to Great Britain.

The British quotation, March 10, 1916, for tungsten ore, 70 per cent WO₃, was \$13.38 per unit, c.i.f. As high as \$105 to \$110 per unit has been paid in the United States where the supplies of ore are scarce. Ferrotungsten, 96 to 98 per cent pure, was quoted in Sheffield, England, March 3, 1916, at \$1.41 per pound of contained tungsten. In the United States it is selling as high as \$8 to \$10 per pound.

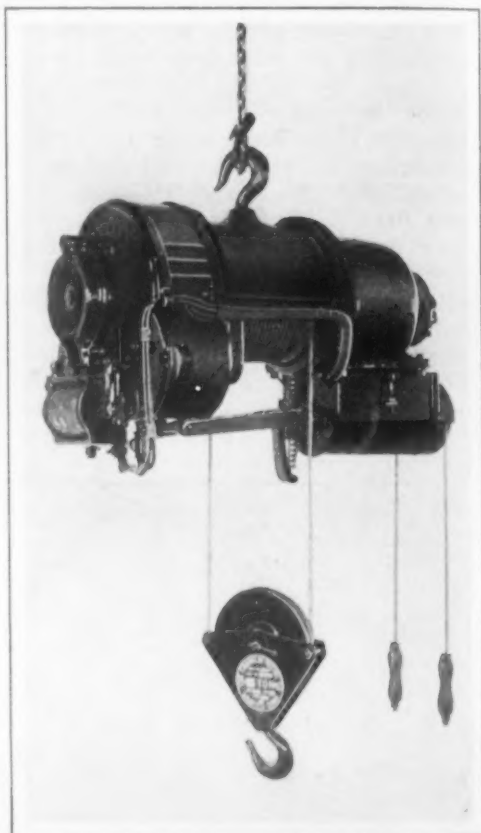
High-Speed Steel Containing Uranium

A new high-speed steel, said to contain uranium, and put out under the trade name Electrite, is the product of the Latrobe Electric Steel Company, Latrobe, Pa., and made in an electric furnace. The company states that the demand for this new steel is large.

Continuous Service Electric Hoist

The Franklin Moore Company, Winsted, Conn., has developed a line of electric hoists for continuous heavy duty service. The hoists range in capacity from 500 to 10,000 lb. and in designing the line a separate size of motor has been used for each different hoist, thus giving, it is explained, a lifting speed that is best suited to the maximum load to be handled.

Compactness of the design, it is emphasized, has effected a material saving in several dimensions, such as the headroom required and the length and the diameter of the hoist. Another change is the substitution of steel plates for iron castings for parts subject to tension, thus resulting in a reduction in weight. The standard hoist is of the hook type, as shown, but it can be supplied in combination with either plain, geared or motor-driven trolleys with either floor or cab control. The gear reduction employs steel spur gears with cut teeth and the shafts are made of extra size and are fitted with bronze bushed bearings. The gears run in an oil bath and it is pointed out that the bearings are exceptionally well lubricated. The equipment includes solenoid and mechanical brakes, the latter of the mul-



One of a Series of Electric Hoists for Continuous Service in Which the Various Members, Ranging in Capacity from 500 to 10,000 Lb., Are Equipped with Motors Designed to Secure the Most Efficient Lifting Speed for the Maximum Load

tipple-disk friction type, and an automatic stop which cuts off the power when the lower hook reaches the upper limit of its travel is provided.

Both alternating and direct current hoists are built, the latter being the one recommended for foundry work on account of the fine regulation of speed that can be secured. With this type of control, it is pointed out, it is possible to raise and lower the load a fraction of an inch, if necessary, without shock.

Chrome ore production in New Caledonia increased in 1914 over 1915 by 25,159 metric tons, or 35 per cent, according to recently published data. Exports of chrome ore from that country in 1914 were 71,708 tons, against 73,277 tons in 1913 and 50,495 tons in 1912. The United States took 25,102 tons of the 1914 exports, 18,647 tons of the 1913 exports and 13,431 tons of the 1912 exports.

A 2000-Ton Billet Extrusion Press

An extrusion press of the four-column type capable of turning out 6000 lb. of billets per hour has been built by the Southwark Foundry & Machine Company, Philadelphia, Pa. The product of the machine is a billet $5\frac{1}{4}$ in. in diameter and 25 in. long, and weighing approximately 200 lb. The extrusion of the billets at an hourly rate of thirty is completed in a single operation and no annealing is required.

Special steel castings and forgings are used almost entirely in the construction of the press, the exceptions being the main ram and some of the minor parts, for which close grained iron castings are employed. For operating the press an accumulator 12 in. square in section is recommended. This accumulator supplies the working pressure of 4000 lb. per square inch and is used in conjunction with a steel ballast tank containing ballast weighing approximately 250 lb. per cubic foot. In cases where a special finish is required a pickling operation has to be performed, but in ordinary cases it is not required. A special safety valve is fitted to the accumulator to prevent the main ram from dropping at a dangerous speed in the event of the failure of a pipe line. This valve is also relied upon to act as a governor and regulate the extruding speed to an economical rate.

A cast-iron table, 50 in. long, is provided to support the extruded rods and a 30-ton cutting-off press is located between the table and the back of the press to sever the ram stump of the billet from the die block. If desired the press can be used for drawing out copper tubing after the container castings are removed, as the stroke is of sufficient length. Special alloy steel having a high tensile strength is used for the pressure chamber. The use of a special grade of alloy steel for the walls of the pressure chamber is made necessary by the high temperature to which they are raised during the extrusion of the billets.

A jacket is provided through which are passed

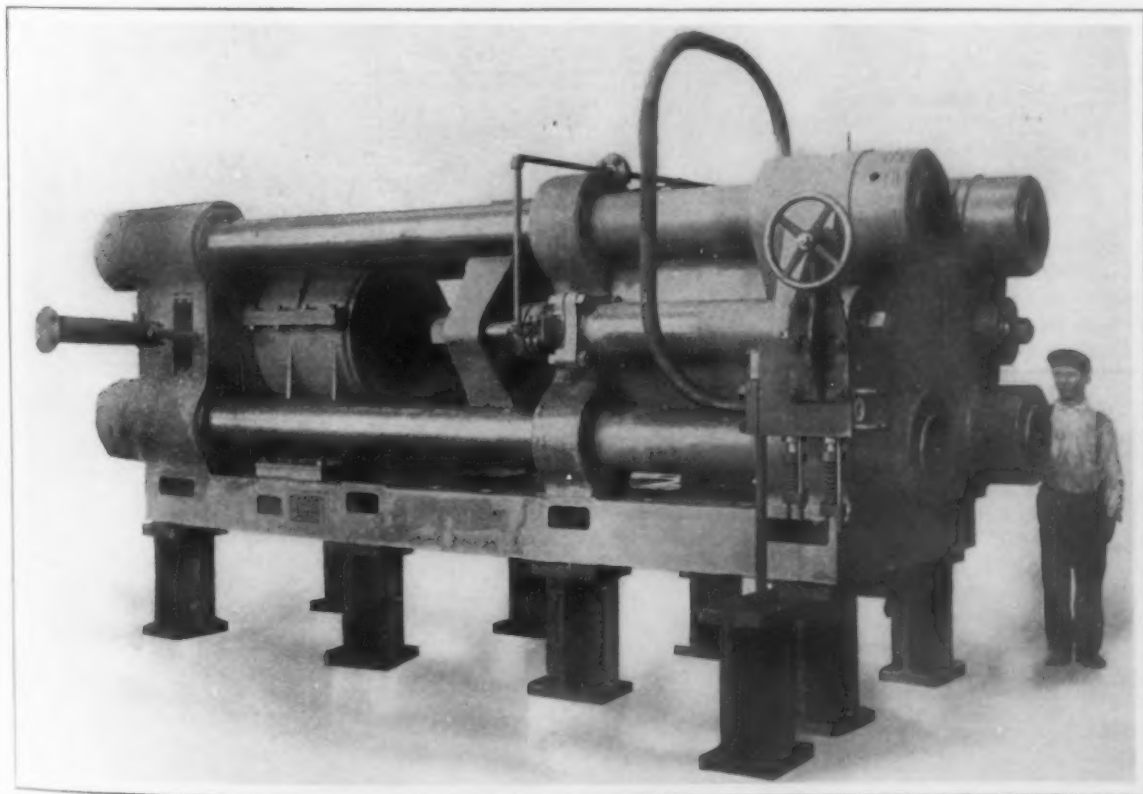
the heated gases from the fireplace beneath the pressure chamber. This arrangement is employed to heat the chamber to 600 deg. Fahr., and the gases afterward escape through a pipe located above the chamber. In this way the chamber is heated so that the metal blocks, which have a temperature ranging from 1650 to 1800 deg. Fahr., are not cooled suddenly when placed in position. Thus, it is explained, the surface of the metal does not lose its plasticity, which would tend to produce extreme variations in extruding operation if not making it practically impossible to perform it successfully.

Welded Submarine Gas Mains

Two gas mains of extra heavy pipe 10 in. in diameter with a $\frac{3}{8}$ -in. wall thickness were recently laid across the Brazos River at Waco, Tex., by the Phoenix Construction Company, New York City. Rapid changes in the river level and deep layers of quicksand on the river bottom complicated the problem. To prevent the mains from being washed out, a ditch 12 ft. deep was dug through the quicksand and the underlying gravel all the way across the river bed. On the upstream side of the ditch a substantial falsework was constructed, upon which a combined pile driver and derrick could be moved back and forth as the work progressed.

Five 20-ft. lengths of pipe were welded into 100-ft. sections in the ditch on the west bank of the river by the Prest-O-Lite oxy-acetylene process. The welds were of the butt type employing Norway iron welding wire as a filler. About 14 oz. was required for each joint and the total cost of a joint was \$1.10 each. As the 100-ft. lengths were welded together, they were pulled out over the falsework and the final joints between the sections were made there. When the pipe line was completed it was sunk by attaching 115 lb. of steel piling to each 20-ft. length of pipe.

The briquetting of iron ore, flue dust, etc., by using as a binder pyroligneous tar obtained from wood distillation, is patented by D. H. Bibb and assigned to the Continental Process Corporation, Briar Cliff Village, N. Y. With flue dust, it is said from 6 to 8 per cent by weight of such tar will make a good briquette.



A Billet Extrusion Press Capable of Exerting a Pressure of 4000 Lb. per Sq. In. and Turning Out 30 Billets $5\frac{1}{4}$ In. in Diameter and 25 In. Long Every Hour

Powdered Coal in the Open-Hearth Furnace

Success Without Regenerators—Burners and Coal Feeders for Various Purposes—Opportunity to Make Steam with the Waste Heat

A REMARKABLE paper, giving the results of late experiences of the American Iron & Steel Mfg. Company with the use of powdered coal in metallurgical and other furnaces, was read before the Franklin Institute, Philadelphia, on the evening of April 6, by C. J. Gadd, chief engineer of the company. He recounted briefly the experiments with different forms of burners applied to open-hearth furnaces, and finally showed the cross-section, here reproduced, of an open-hearth furnace fired at one end and operated without regenerators; in other words, taking the air for combustion at room temperature. In connection with this furnace is an interesting arrangement of waste-heat apparatus involving two steam boilers and an economizer, both the boiler installation and the economizer installation by-passed when necessary for repairs so as not to shut down the furnace plant.

Mr. Gadd also showed drawings covering the application of powdered coal burning to a continuous billet-heating furnace, the puddling furnace and the soaking pit, this in itself a noteworthy development, and he outlined also the arrangement for the application of waste heat boilers to these furnaces. He introduced the paper with a brief summary of the essential features necessary for success in the use of powdered coal in metallurgical furnaces, and showed the arrangement of the coal treating plant, including the drying and pulverizing apparatus and the scheme for distribution of the powdered fuel to

the open-hearth furnaces and the soaking pits so that there will be no clogging of the fuel in the conveyors. This coal plant provides a large storage of coal of 1-in. cubes and under in size, the coarser coal from the crushing plant being spouted for use elsewhere, as in some steam boilers of the plant.

OPEN-HEARTH FURNACE WITHOUT REGENERATORS

Mr. Gadd designates the installation of the open-hearth furnace without regenerators as "a somewhat radical departure from the old-time theories of open-hearth furnace practice." The burners are arranged only at one end of the furnace and the path of the flame is always in the one direction. The theory underlying this method of applying powdered coal to the open-hearth furnace is, as Mr. Gadd gives it, as follows:

1. The fuel is burned above the bath, and all the heat contained in the coal is instantly developed in the furnace.
2. As the path of the flame is in one direction all parts of the furnace are maintained at the same temperature.
3. By reason of their high radiating capacity, the infinite number of minute incandescent particles in the powdered coal communicate the heat by radiation, and not by convection, thus eliminating the necessity of bringing the surrounding air to the temperature of the coal particles.
4. All the heat in the waste gases is conserved and used in the production of steam.

The extra fuel consumed, due to the use of cold air, is offset:

1. By the elimination of all loss in the gas producer process.

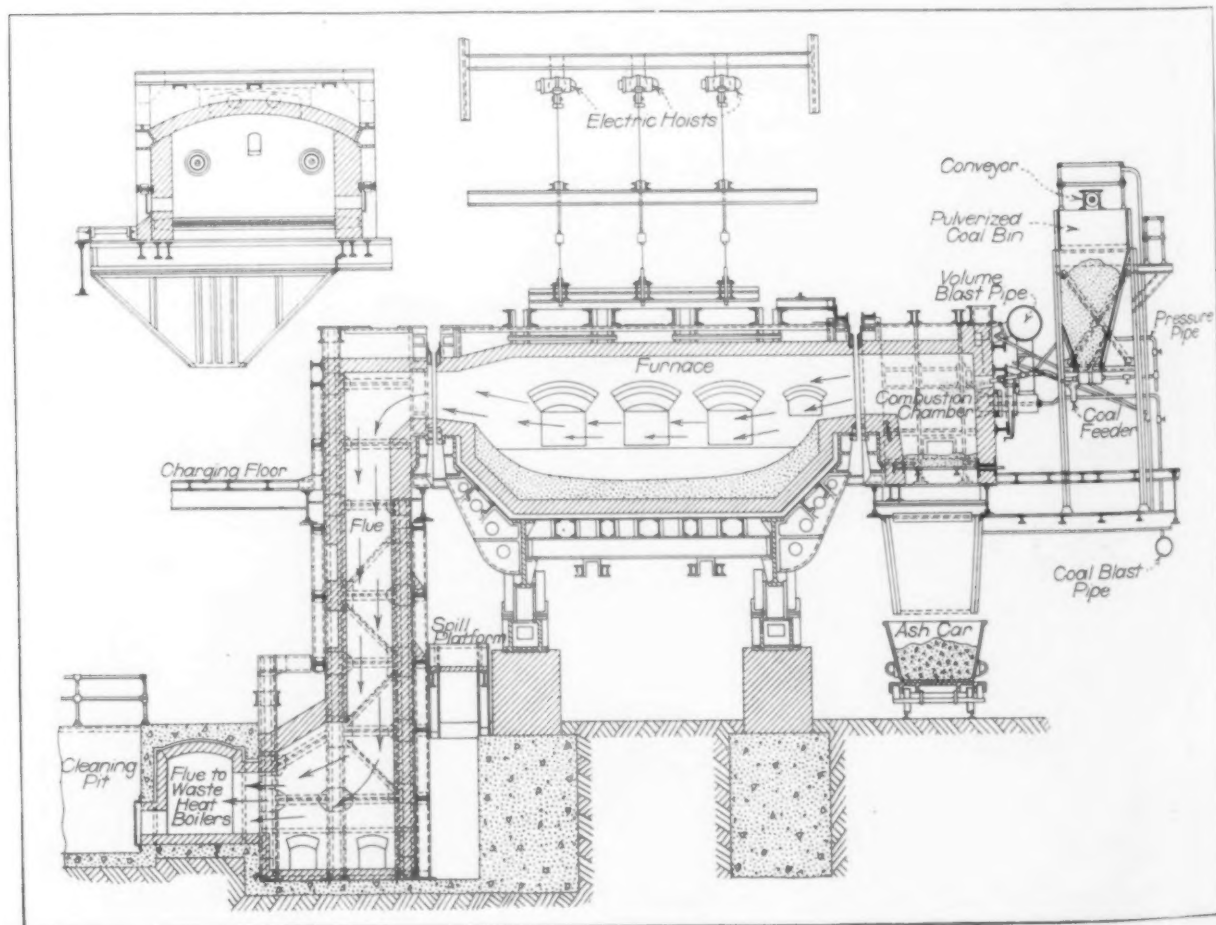


Fig. 1—The Furnace is Fired From One End, with Two Low-Pressure Burners and One High-Pressure Burner, and There are No Regenerators

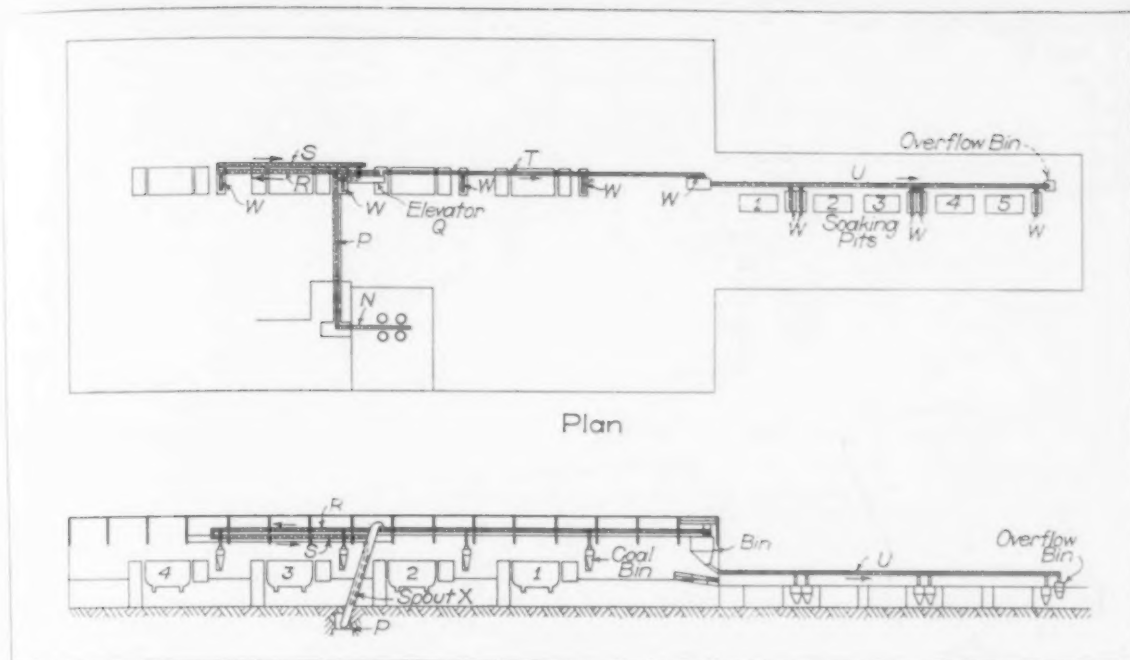


Fig. 2—Powdered Coal Delivered Beyond the Needs of the Furnaces Serves in Part for the Supply of the Soaking Pits and a Supplementary Bin Provides for the Surplus in this Department

2. By the elimination of all loss due to frequent reversals.
3. By the elimination of all loss in waste heat taken up by the regenerative chambers.
4. By the elimination of the expensive maintenance cost of producer plant and regenerative chambers.
5. By the greatly reduced first cost of installation.

The accompanying drawing includes a section through the combustion chamber looking toward the back wall. It will be noted that three burners are employed, the center one of the high-pressure siphon-type shown in Fig. 8, the two side ones of the low-pressure type shown in Fig. 4. The combustion chamber is maintained at a high uniform temperature at all times by the two low-pressure burners. The high temperature thus maintained preheats the air furnished to support combustion and, as the high-pressure siphon burner discharges the powdered coal through the hot zone of the chamber, complete combustion of the fuel is insured. Auxiliary air for combustion is admitted through the back wall of the combustion chamber at the roof line.

The accumulation of ash in the combustion chamber is raked out through the cleaning doors after every heat and is discharged through a trap-door in the charging floor into the ash car below. From a metallurgical standpoint the deposit of ash on the bath is too small an amount to be noticeable.

In the slag pocket at the bottom of the vertical flue, the ash and the brick slag form a thick pasty mass, the tough consistency of which makes its removal difficult. Beyond this point the ash settles in the flues as an impalpable powder. After each heat it is stirred up by inserting a compressed-air jet through the separate cleaning doors of the flues. The ash clouds thus produced are picked up by the flue draft and are carried in suspension out of the stack. The tubes of the waste-heat boilers installed are cleaned with steam blowers four times each day.

Within the past few months four 50-ton basic open-hearth furnaces thus arranged have been placed in operation. In this short period operating conditions have demonstrated the soundness of both the underlying theory and the engineering principles involved in this method.

Compared with producer gas, Mr. Gadd says, equally high temperature is attained. Uniform temperatures throughout the furnace are maintained. Heats can be made within reasonable time.

Fuel consumption is high. This, however, is offset by the fact that the waste-heat plant produces an average evaporation of $6\frac{1}{4}$ lb. of water per pound of coal fired in the furnace. Compared with the best boiler room practice, $62\frac{1}{2}$ per cent of the fuel consumed by the furnace is used in the generation of steam, leaving $37\frac{1}{2}$ per cent chargeable to steel production. Based on this reasoning, economies over oil and producer gas are fully substantiated.

DISTRIBUTING AND STORING POWDERED COAL

The plan and elevation of the powdered coal distributing system, Fig. 2, shows the arrangement for supplying four 50-ton open-hearth furnaces and five double-soaking pits. The dustproof screw conveyor *P* carries the coal to the dustproof elevator *Q*, which discharges into the dustproof screw conveyors *R* and *T*. The powdered coal in conveyor *R* travels in the direction as indicated by the arrow, and feeds the coal storage bins located at furnaces Nos. 3 and 4. Any coal left in this conveyor after passing the coal storage bin at furnace No. 4 is discharged at the end of the line into the dustproof screw conveyor *S* below, which returns the surplus coal to the spout *X*, and thence by gravity to the shoe of elevator *Q*. With this arrangement there is little possibility of the conveying system being choked through careless operation. The powdered coal fed to conveyor *T* travels in the direction as indicated by the arrow and feeds the coal storage bins located at furnaces Nos. 2 and 1. The storage bin at the end of the line into which this conveyor discharges eliminates the possibility of stalling the conveyor. In addition to feeding coal to the storage bins at furnaces Nos. 2 and 1, all the coal used by the soaking pits is conveyed over this line. The dustproof screw conveyor *U* feeds the powdered coal to the five storage bins located at each of the five double-soaking pits. The storage bins at the open-hearth furnaces and soaking pits are equipped with an automatic weighing machine, recording the weight of coal fed to each furnace, and the coal from these scales is distributed in the storage bins by the dustproof screw conveyors *W*.

From the time the coal leaves the dryer to its delivery in the furnace the whole system between these points should be dustproof, and the greatest

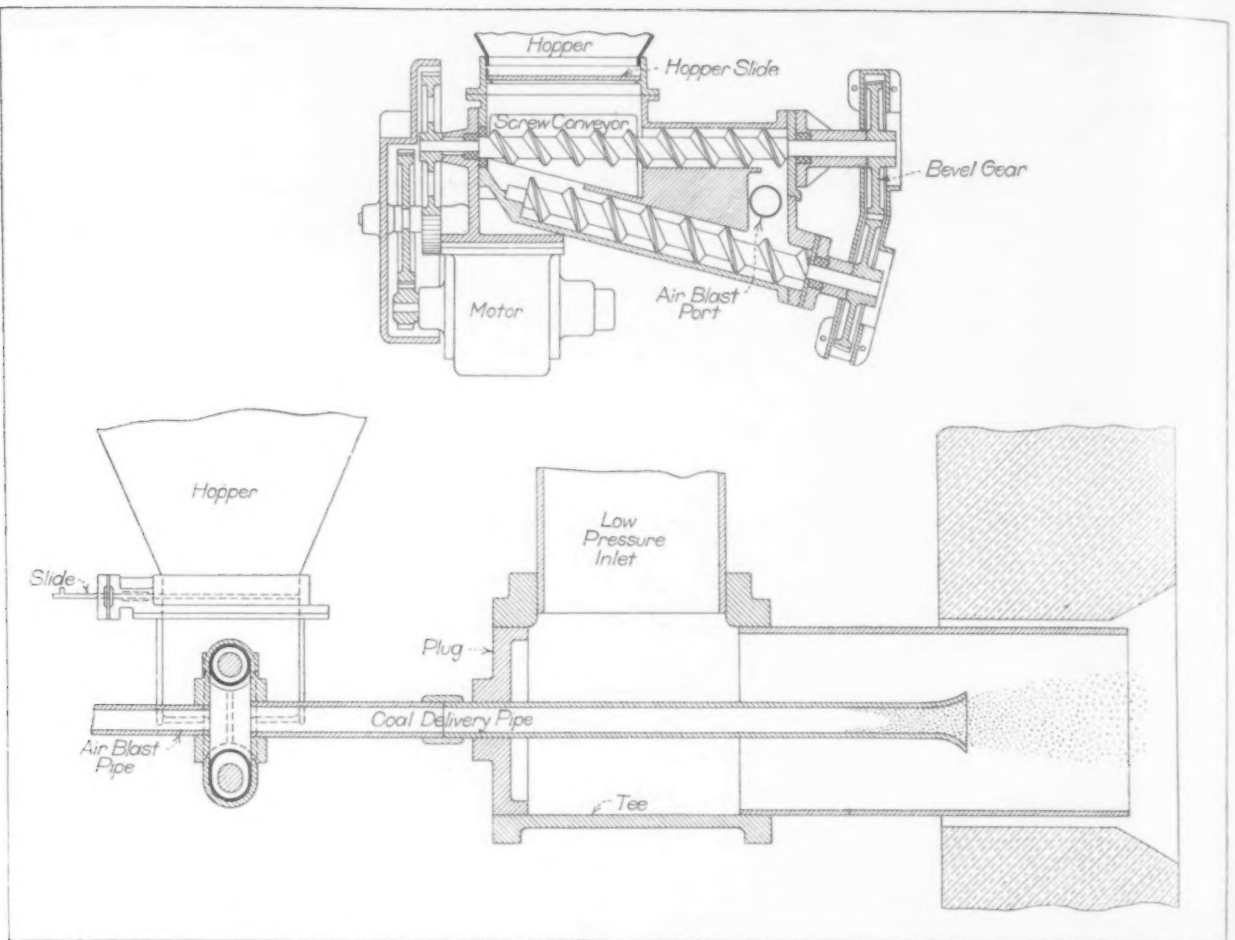


Fig. 3—Powdered Coal Burner with Screw Feeder or Controller

care should be taken to prevent leakage. This should be guarded against systematically, as leaks, however small, may permit the surrounding air in the room to become impregnated with coal dust to such an extent that a serious explosion may result.

Coal after pulverizing should be handled in bulk. All types of aerial propulsion and transfer in the form of dust clouds, Mr. Gadd holds, should be avoided for the reason that accidental ignition may at any time wreck the whole system. Screw conveyors and bucket elevators equipped with dust-proof casings are best adapted to handling powdered coal in bulk. Screw conveyors of 9 in. and 12 in.

diameter should not exceed 250 and 300 ft. respectively, if the best results are to be expected. Where transmission lines of greater length are necessary they should be divided.

The storage of powdered coal in large or small quantities for any length of time is not advisable, owing to its tendency to fire, collect moisture and pack. Powdered coal in storage containing about $\frac{3}{4}$ per cent moisture and 1 per cent sulphur will invariably fire within six days. If the moisture be increased to over 1 per cent and the sulphur to 4 or 5 per cent, spontaneous combustion may occur within 24 hr. Probably the temperature at which

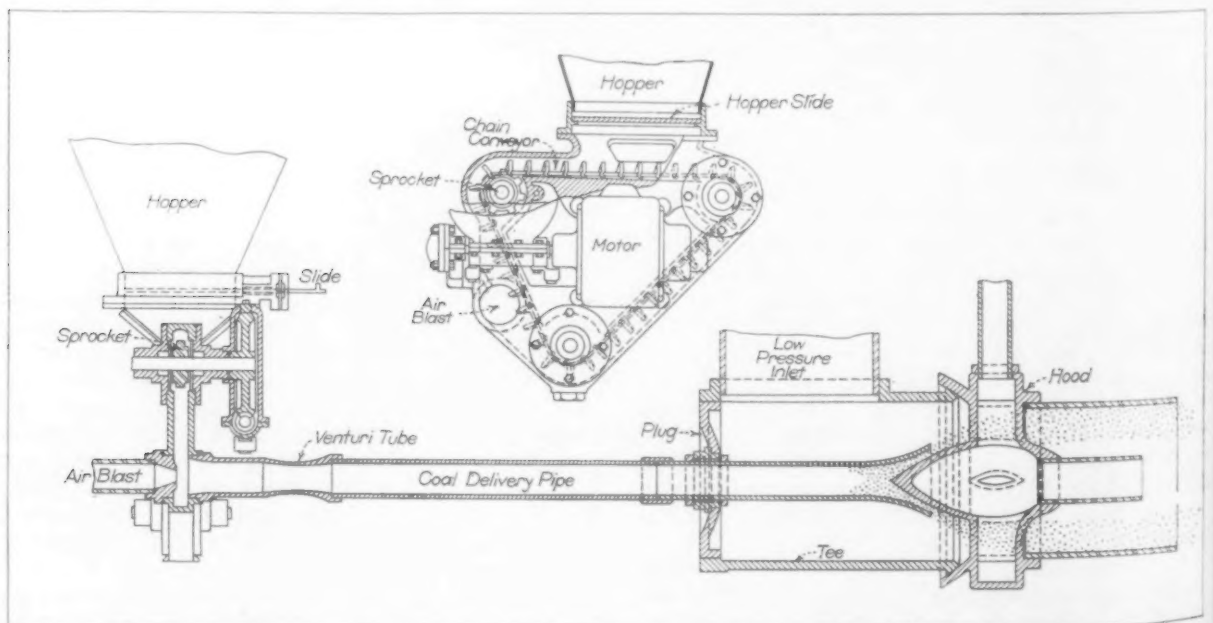


Fig. 4—Powdered Coal Burner with Flight Type Feeder

powdered coal is delivered to the storage bin and the sulphur content of the coal influence the rate of spontaneous combustion rather than moisture.

Owing to the hygroscopic nature of dried powdered coal, long storage is not desirable. In its normal state powdered coal is light and fluffy; after 48 hr. standing in storage, however, the physical arrangement of the particles produces a dense packed mass. So dense does the fuel become that one's fingers cannot make an impression even $\frac{1}{2}$ in. deep. To meet ideal conditions powdered coal should be kept in motion. With properly designed machinery and storage bins, having 12 hr. supply placed at each furnace, the coal may be kept in motion and repairs and adjustments made before the supply becomes exhausted.

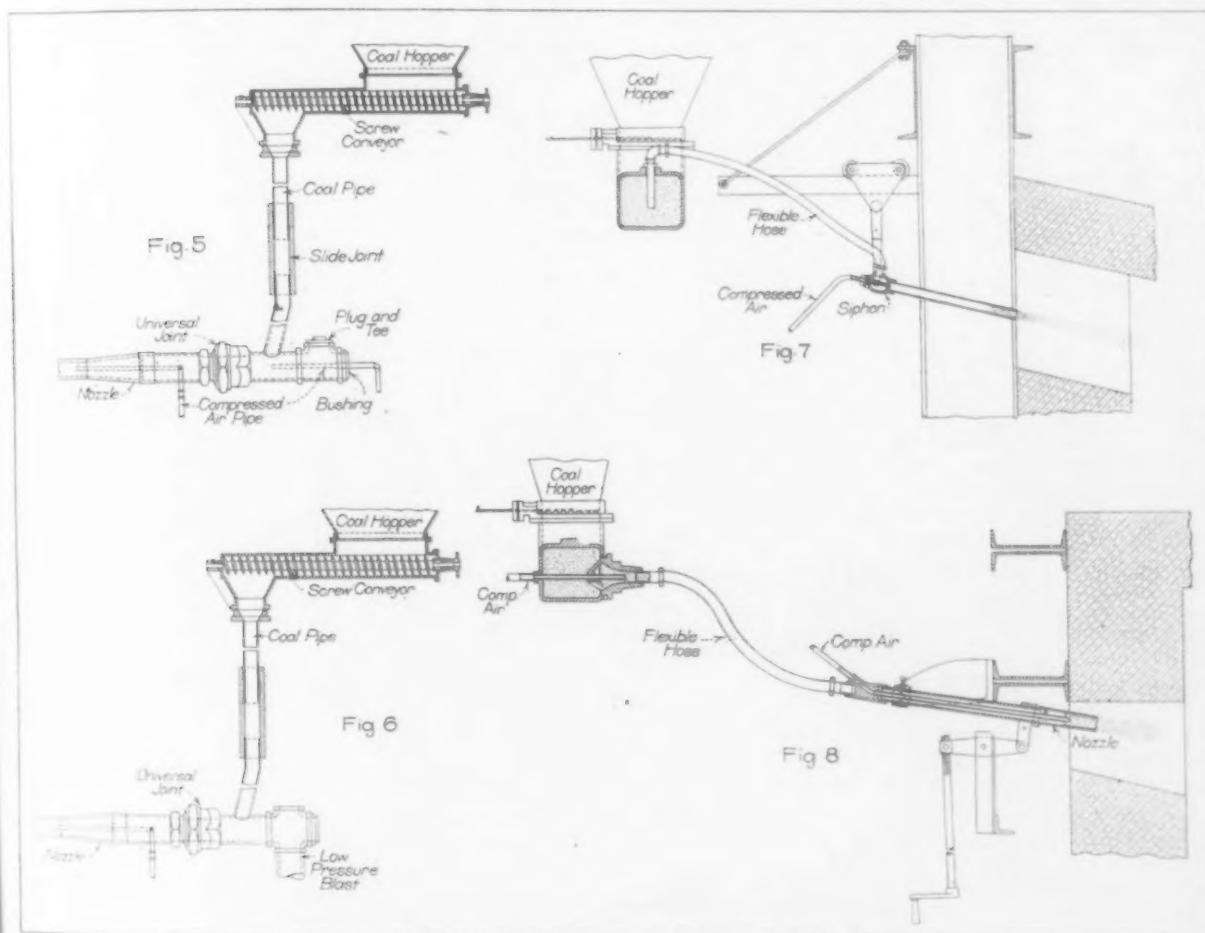
THE FUEL AND ITS PREPARATION

Low-grade bituminous coals, anthracite, lignites

In drying coal containing about $1\frac{1}{4}$ per cent moisture, to be dried to $\frac{1}{2}$ per cent or less, the fuel consumption should not exceed 26 lb. per ton.

The power consumption for operating the complete drying unit, which includes the power consumed by the coal feeding mechanism, the dust fan, the stoking device and in revolving the dryer cylinder for a 10-ton capacity dryer, figures about $1\frac{1}{2}$ kw.-hr. per ton of dried coal.

It is easier to dry coal to $\frac{1}{2}$ per cent moisture or less than it is to maintain it in this state. This is explained by Mr. Gadd as follows: The moisture driven off from the coal in the process of drying saturates the hot air contained in the dryer cylinder. In this highly saturated condition the air follows the dried coal through the dustproof conveying system to the inclosed storage bin. As the coal and air cool, moisture is precipitated and the volume of the air diminished, with the result that



Four Forms of High-Pressure Coal Burners

and even coke breeze in a powdered form can be burned with good results, certain types of heating furnaces now being operated with such fuels. It should be understood that the first cost of fuel used is not the correct index by which to judge of economy when fuel must be prepared and pulverized. Slack coal is preferable to other forms; it costs less, requires less power for pulverizing, owing to its fine state, and materially increases the capacity of the pulverizer. For metallurgical furnaces only the best bituminous coals, high in volatile content and low in both sulphur and ash, are desirable. Coal should closely approximate the following analysis:

	For Heating and Puddling	For Open-hearth Furnaces
Volatile matter....	Not under 30.00	Not under 36.00
Fixed carbon.....	Not under 50.00	Not under 48.00
Moisture	Not over 1.25	Not over 1.25
Ash	Not over 9.50	Not over 6.00
Sulphur	Not over 1.00	Not over 1.00

more warm saturated air is drawn from the dryer. These conditions, obviously, meet the requirements of a still of fair proportions.

The precipitation of moisture resulting from the cooling process of the coal and air may be almost entirely overcome by placing ventilating shafts on the storage bin and the high points of the conveying system connected with the outside air. Each shaft should be equipped with a ventilator of approved type, and proper provision should be made to collect and deflect any condensation in the ventilating shafts, so as to prevent its return. It is thus evident that in the process of drying, through the medium of heat, a small quantity of the expelled moisture will find its way back in the coal after cooling. For this reason it is good practice to gage the dryer so that the resultant product leaving the dryer will contain less than $\frac{1}{2}$ per cent moisture.

One of the pulverizers largely used is the Fuller-Lehigh mill. The coal and air cool off in their course through the dustproof distributing system to the inclosed storage bins, and attention must be given to ventilation. Otherwise it would be a common occurrence to find water dripping from the bottom of storage bins ten or twelve hours after filling.

Pulverizing mills of the type mentioned having a capacity of about $4\frac{1}{2}$ tons per hour, pulverizing to a fineness so that 95 per cent will pass through a 100-mesh sieve and 83 per cent through a 200-mesh sieve, will consume about 10.5 kw.-hr. per ton of product. In a plant having an average output of 200 tons of powdered coal per day the cost is as follows:

Cost of Pulverized Coal	
	Per Gross Ton of Coal Produced
Fuel for dryer.....	\$0.030
Repairs, buildings, machinery and equipment.....	.200
Labor.....	.150
Power and light.....	.215
Supplies.....	.005
	<hr/> \$0.600

by the cross current of air will vary with the pressure of the air blast, which is controlled by a suitable valve placed in the blast line. Any excess fuel escaping the feeding action of the air blast is automatically returned to the hopper by the lower inclined conveyor screw. The coal-delivery pipe discharges its mixture into the burner, the low-pressure inlet pipe furnishing the necessary additional air for combustion.

Fig. 4 shows another mechanically operated low-pressure powdered-coal feeding apparatus. An endless flight conveyor chain is used for feeding a stream of powdered coal in a continuous shower across the air-blast ports. The excess fuel is automatically returned to the hopper by the endless flight conveyor chain.

The air-blast inlet nozzle connecting with one side of the feeder case is reduced, the outlet side being flared, beyond which is a Venturi tube used to induce higher velocity of the mixture leaving the feeder, thereby causing a slight vacuum or pull throughout the case. The cone extension on the

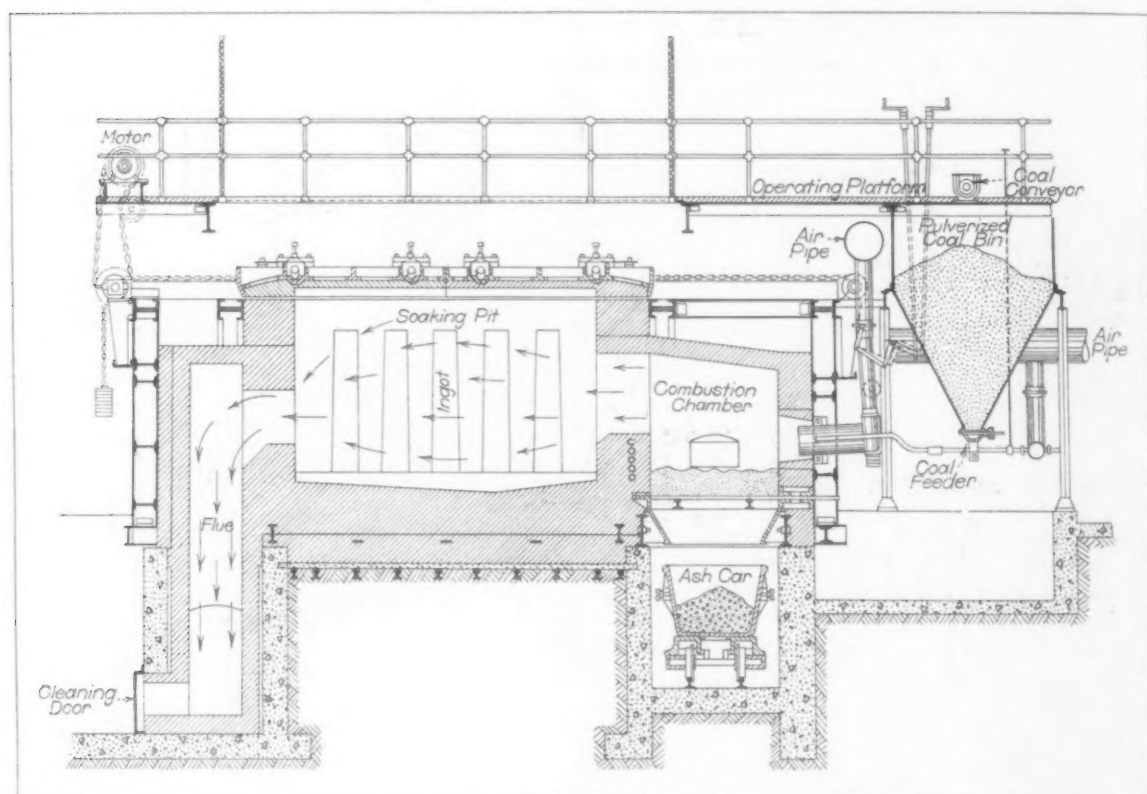


Fig. 9—Powdered Coal Burning As Applied to Soaking Pits

The figures include all costs from the receipt of the coal in the cars to its delivery in a powdered state in the furnace. No allowance has been made for overhead and depreciation. Shrinkage in the coal becomes a prominent factor, and must not be lost sight of. It may vary from 150 to 270 lb. per gross ton.

FEEDERS AND BURNERS

The parts of Mr. Gadd's paper having to do with the burners are in part as follows:

Fig. 3 illustrates a sectional elevation of a mechanically operated low-pressure feeding apparatus for coal dust, also a sectional view of the feeder taken across the air-blast ports, showing the method of connection with the burner. The quantity of fuel delivered by the conveyor screw is regulated by varying the speed of rotation, which in this case is obtained through a direct-connected variable-speed motor. The amount of fuel taken up

hood of the burner enters the flared end of the coal-delivery pipe, breaking the solid shaft of coal and air and deflecting it around the inner periphery of the burner pipe. The mixture takes the form of a hollow ring, in the center of which an auxiliary blast is discharged, giving a thorough atomization of the particles as they enter the furnace.

Powdered coal will flush, and when once started will run like water. Screw feeding devices should, therefore, be made very long and of a reasonably fine pitch in order to set up enough friction and baffling action to prevent the coal from flushing through the feeding mechanism and causing irregular feed. In Fig. 4 the vertical flights and the conveyor chain have a baffling action which prevents flooding. Under operating conditions it has been proved that the coal will not pack in the feeder should the air blast be cut off. The air-blast nozzle and Venturi tube, producing a suction through the case, have a tendency to prevent arching in the hop-

per. In addition, this suction prevents leakages as there is always an inward pull on the case.

Fig. 5 shows a sectional elevation of a mechanically-operated high-pressure powdered-coal feeding apparatus. A long screw of fine pitch conveys the coal from the hopper and discharges a uniform stream of powdered fuel into the coal pipe. This stream falls by gravity down the coal pipe and is picked up by a cross jet of compressed air as it enters the burner. The expansion of the compressed air in the larger diameter of the burner mixes the coal and air and this mixture is injected from the burner into the furnace at high velocity by the compressed air jet at the end of the nozzle. By varying the speed of rotation of the conveyor screw variable fuel feed is obtained.

Fig. 6 illustrates a sectional elevation of a mechanically-operated high-pressure feeding apparatus. Low-pressure air of 1 lb. pressure is used to pick up the stream of coal delivered to the burner by the feeding device. Figs. 7 and 8 illustrate siphon-type feeders and burners.

Feeders and burners of the high-pressure type produce a long flame through progressive combustion and can only be used where the form of the furnace and the character of the work demand that an elongated cutting flame be developed in close proximity to the work done. This method of application is adapted to open-hearth furnace practice. In the type of feeders and burners described the results obtained are equally good whether the powdered coal is injected into the furnace from the burner at a velocity of 1500 ft. per minute or of 25,000 ft. per minute.

POWDERED COAL FOR SOAKING PITS

The use of powdered coal as a fuel in soaking pits represents probably the latest application of this form of fuel in the metallurgical arts. Fig. 9 shows a sectional elevation through a soaking pit equipped for burning this form of fuel. Five double soaking pits of the general design shown are now in operation and are giving very satisfactory results.

Besides the open-hearth installation already described, Mr. Gadd discussed three other methods of applying powdered coal to open-hearth furnaces, in which high-pressure siphon-type burners are used similar to those shown in Figs. 5, 6 and 7. One burner is placed on each end of the furnace, the fuel being reversed as in the case of producer gas. As the gas flues are eliminated in this process, the regenerative chambers in most cases have been enlarged, and in place of checkers, staggered arches or parallel walls have been built to give the necessary regenerative area. There are at the present time one 75-ton, three 60-ton and four 35-ton furnaces of the regenerative type in operation. At one plant the results obtained have been so encouraging that a second furnace of 75 tons capacity is now under construction.

PERSONAL EQUATION AN IMPORTANT FACTOR

Mr. Gadd puts the personal equation as the important factor in the operating part of the apparatus as developed thus far. It is necessary, he says, to depend too greatly upon this uncertain element.

In the drying process, the operator may at any moment upset the complete equilibrium of a plant either by overheating the coal or by not drying it enough.

In the furnace operation, three or four separate adjustments are required, depending on the burner used, each adjustment bearing a fixed relation to the others. These adjustments are: The control of

the coal feed, the control of the coal blast, the control of the volume blast and the control of the furnace draft, where mechanically-operated low-pressure feeders and burners are employed.

In the drying process an automatic control of the coal feed, governed by the temperature of the dryer cylinder, might be developed. In the case of the burners and feeders a single adjustment might be made to regulate and supply the correct proportion of air and coal, with provision for adjusting the air and coal independently in order to obtain correct proportions for different grades of fuel, thus producing an absolutely uniform combustible mixture, which will be maintained regardless of the quantity supplied, after once setting the adjustment.

In concluding his paper, the author says: "The high economy and efficiency of powdered coal in the metallurgical processes, under the limited application of this fuel and the limited development of apparatus, provide an index of its possibilities under more general use. With a further development of apparatus this form of fuel doubtless will eventually supplant oil, tar and producer gas in the varied fields where they now hold supremacy."

Book Reviews

Lathe Design, Construction and Operation. By Oscar E. Perrigo. Pages, 469, 6 x 9 in.; illustrations, 341. Published by the Norman W. Henley Publishing Company, 132 Nassau Street, New York City. Price, \$2.50.

This edition, which is a revision and enlargement of the book published in 1907, aims to present, as comprehensively as is possible within the limits of a single volume, the history and development of the lathe from early times to the present day, to describe its practical use on various classes of work and to compare the types of lathes built in this country. These machines are brought together in a comprehensive manner, thus producing a work that is a book of reference not only for the student, the designer and the machinist, but also for the builder and purchaser of this class of machine tools. In revising the book a chapter has been added covering in considerable detail lathe work of various kinds, together with instructions for the installation and operation of lathes. Attachments for doing milling, drilling and grinding in a lathe are described, together with instructions for their use. Methods of turning tapers and spherical surfaces and the cutting of oil grooves are also outlined.

"Luminosity of a Black Body and Temperature" deals with the relation between luminosity or total brightness of a radiating material, more especially a black body, and its temperature. With this relation once established, a new type of pyrometer may be devised for the measurement of excessively high temperatures. The discussion is contained in Scientific Paper No. 270, published by the United States Bureau of Standards.

"Research on the Corrosion Resistance of Copper Steel" is the title of the bulletin which the American Sheet & Tin Plate Company, Pittsburgh, is circulating. It covers fully the extensive experiments and study made by D. M. Buck, metallurgical engineer of the company, and J. O. Handy, director of laboratories of the Pittsburgh Testing Laboratory, Pittsburgh. An abstract of this work appeared in THE IRON AGE of March 9.

The Rittman process for making gasoline, benzol, toluol, etc., by the cracking of petroleum is the subject of Bulletin 114 entitled "Manufacture of Gasoline and Benzene-Toluene from Petroleum and other Hydrocarbons." It is written by W. F. Rittman, C. B. Dutton, and E. W. Dean, with a bibliography compiled by M. S. Howard.

Influence of Thickness on Tensile Tests

An Investigation Showing How Variations Affect the Static Properties of Open-Hearth and Bessemer Steel Plates

BY G. B. WATERHOUSE

The work here described was carried out in connection with some comprehensive tests on steel plate, and throws some light on the influence of thickness on the results of tensile tests, besides giving comparative results on basic open-hearth and acid Bessemer steel. This question of the influence of thickness is one that is fully appreciated by all who have thoughtfully studied the testing of steel, and should be recognized in carefully drawn specifications. Among those who early drew attention to it was J. Riley in his paper on mild steel

his results being published in the *Transactions American Institute of Mining Engineers*, Vol. 21, p. 766, and Vol. 23, p. 113. In the latter paper he gives his final corrections in regard to ultimate stress for size of plate up to 70 in. wide, as shown below:

3/4 in. thick and over, minus 2,000 lb.
1 1/16 in. thick and over, minus 1,750 lb.
5/8 in. thick and over, minus 1,500 lb.
9/16 in. thick and over, minus 1,250 lb.
1/2 in. thick and over, minus 1,000 lb.
7/16 in. thick and over, minus 500 lb.
3/8 in. thick and over, plus or minus 0
5/16 in. thick and over, plus 3,000 lb.

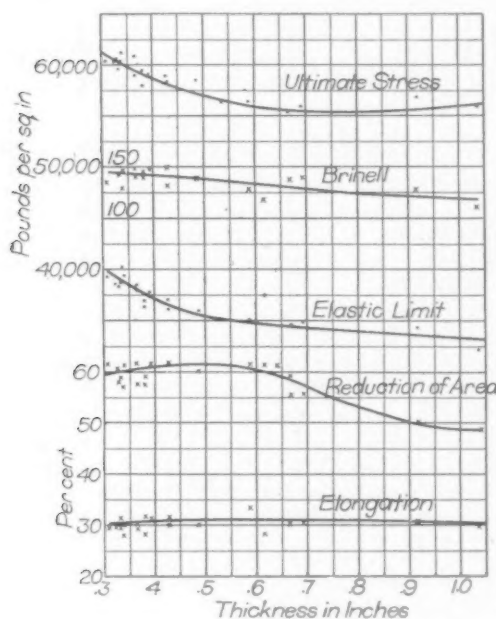


Fig. 1

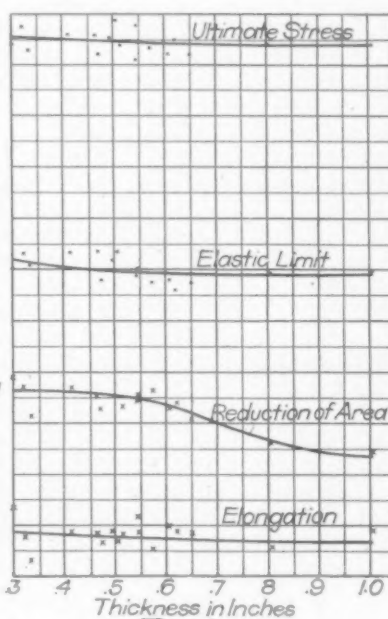


Fig. 2

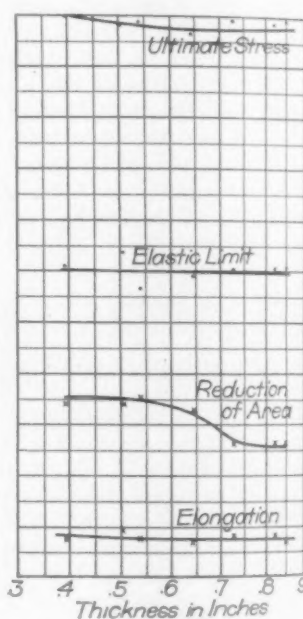


Fig. 3

Plotted Results of the Tests on the Various Steels.

Fig. 1 shows those obtained on open-hearth steel.

Fig. 2 shows those obtained on ordinary Bessemer steel.

Fig. 3 shows those obtained on higher carbon Bessemer steel.

plate. (*Journal Iron and Steel Inst.*, Vol. 1, 1887, p. 121.) H. H. Campbell gives the following table of averages drawn from Riley's results:

Thickness, Inches	Ultimate Stress, Lb. per Sq. In.	Elongation, Per Cent in 8 In.	Reduction of Area Per Cent
0.25	69,642	22.35	42.68
0.50	64,534	24.71	44.85
1.00	62,037	24.40	40.20

There is, naturally, a very thorough discussion of the subject in Professor Howe's *Metallurgy of Steel* (1891 Edition, beginning on page 243). He reviews all the evidence then obtainable, and presenting it in tabular form, reaches the following conclusion, for pieces 1 in. thick and less:

The indications seem to be that thinner pieces of soft steel may, but do not necessarily, excel similar ones 1 in. thick in tensile strength and elastic limit; that they are likely to be less ductile than the 1 in. pieces.

W. R. Webster, in his very careful work carried out at the Pottstown Iron Company, on the relation between the chemical composition and the physical character of steel plate, recognized all through the influence of different thicknesses of plate. The material tested was practically all basic Bessemer,

H. H. Campbell devotes a chapter of his book to the various phases of the subject. (*Manufacture and Properties of Iron and Steel*, 1903 Edition, Chap. 14, p. 364.) He first deals with flats rolled from 16 x 16-in. ingots. One table gives results on flats rolled from different sized billets, and another gives results on similar flats from 3 x 3-in. billets. His remarks are:

There is little difference between bars of the same thickness, even though rolled from different sized billets. A gain in ultimate stress is noticed as the thickness decreases, but the increase is not very marked except in the case of the 1/8 in. flats. The elastic limit follows the same law, but it is raised more than the ultimate stress as the bar gets thinner. The elongation varies irregularly, but as a rule it remains unaffected except in the 1/8 in. where it is lowered to some extent. The reduction of area is also irregular, but it seems to be independent of the thickness even in the thinnest plate.

In regard to plate, he points out that it is not customary to test the same heat in several sizes, but that by long experience the manufacturer is able to judge the relative properties of each thickness. To quote Mr. Campbell again:

The heads of two widely known plate mills have given me as their estimate that, taking 1/2 in. as a basis, there will be the following changes in the physical properties for every increase of 1/4 in. in thickness.

- 1. A decrease in ultimate stress of 1000 lb. per square inch.
- 2. A decrease in elongation of 1 per cent measured in 8 in.
- 3. A decrease in reduction of area of 2 per cent.

This brief review of the literature does not, of course, exhaust the subject, but gives the views of a number of prominent workers. Before passing to the results actually obtained, it is interesting to see how this influence of thickness is recognized in modern specifications. In the 1915 Year Book of the American Society for Testing Materials

The results given below were all obtained on the material known as sheet bar. The ingots were uniformly 19 1/2 x 23 in. After proper heating in the soaking pits they were bloomed to 7 1/4 x 5 in., and were then immediately rolled into sheet bar in a Morgan continuous mill. The sheet bar is 8 in. wide, and varies in thickness or gage. The analyses given are those obtained on the ladle test ingot, and the samples for the tensile tests were all taken from the lower part of the ingot where the analysis agrees with that of the ladle test. The finishing temperature of rolling was practically the same for the different gages tested. From each sample three strips were cut, longitudinally, a little over 2 1/2 in. wide, and before pulling these were milled so that the elongation

Table 1—Results on Open-Hearth Steel

Thickness, Inches	Analysis				Elastic Limit, Lb. per Sq. In.	Ultimate Stress, Lb. per Sq. In.	Elongation, Per Cent in 8 In.	Reduction of Area, Per Cent	Brinell, Hardness
	Carbon, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent					
0.307	0.128	0.50	0.053	0.076	39,245	60,310	29.6	61.3	135
0.325	0.135	0.41	0.044	0.085	38,110	60,320	29.6	60.6	...
0.330	0.129	0.48	0.072	0.079	38,415	60,515	29.7	58.1	144
0.332	0.135	0.41	0.044	0.085	38,590	59,535	31.6	58.9	143
0.337	0.130	0.50	0.039	0.066	40,150	60,210	28.1	57.0	129
0.340	0.128	0.48	0.052	0.078	39,305	61,280	30.0	61.3	145
0.365	0.114	0.34	0.053	0.084	38,550	58,990	29.6	57.6	142
0.365	0.130	0.48	0.048	0.088	37,880	60,800	30.0	61.8	149
0.380	0.115	0.46	0.059	0.068	36,280	59,435	28.1	57.3	146
0.380	0.111	0.39	0.052	0.084	36,670	57,930	31.8	59.0	145
0.392	0.124	0.41	0.049	0.076	37,725	59,045	31.6	61.4	147
0.427	0.127	0.47	0.048	0.089	37,095	58,900	30.0	61.6	150
0.427	0.108	0.38	0.049	0.065	36,055	58,220	31.6	61.8	132
0.485	0.107	0.37	0.038	0.082	35,835	58,455	30.0	60.0	...
0.587	0.120	0.44	0.038	0.065	35,155	56,365	33.3	61.6	128
0.615	0.126	0.42	0.045	0.060	37,550	55,950	28.3	60.3	118
0.667	0.111	0.33	0.044	0.073	34,540	55,500	30.2	59.4	137
0.692	0.120	0.40	0.042	0.063	34,835	55,895	30.8	55.6	140
0.917	0.130	0.47	0.048	0.072	34,360	56,760	30.6	49.9	127
1.035	0.139	0.47	0.044	0.071	32,145	55,905	30.0	48.8	112

Table 2—Results on Bessemer Steel

Thickness, Inches	Analysis				Elastic Limit, Lb. per Sq. In.	Ultimate Stress, Lb. per Sq. In.	Elongation, Per Cent in 8 In.	Reduction of Area, Per Cent
	Carbon, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent				
0.300	0.108	0.40	0.063	0.097	39,885	61,920	33.6	59.0
0.322	0.094	0.40	0.075	0.096	41,625	63,700	28.1	57.2
0.335	0.106	0.38	0.065	0.098	40,465	61,360	23.1	51.5
0.412	0.098	0.43	0.090	0.102	41,835	63,075	28.7	57.1
0.465	0.084	0.44	0.064	0.103	41,940	62,930	28.1	56.1
0.472	0.097	0.41	0.076	0.096	38,845	61,070	26.8	53.0
0.495	0.100	0.36	0.046	0.098	41,055	62,680	29.0	55.9
0.505	0.100	0.47	0.079	0.096	41,820	64,375	27.1	55.6
0.515	0.085	0.40	0.063	0.099	40,225	62,040	28.1	53.1
0.545	0.095	0.40	0.060	0.098	39,370	60,490	28.7	65.7
0.545	0.110	0.37	0.063	0.096	40,100	63,950	31.8	54.8
0.572	0.111	0.46	0.071	0.097	38,680	61,600	25.2	56.7
0.607	0.110	0.43	0.075	0.097	38,870	60,980	29.8	53.3
0.620	0.093	0.35	0.065	0.102	37,890	62,480	29.0	54.2
0.650	0.093	0.41	0.067	0.092	38,745	60,830	28.7	51.0
0.802	0.095	0.40	0.094	0.101	39,465	62,045	25.8	46.3
1.005	0.090	0.42	0.055	0.094	39,680	61,935	29.3	44.4

Table 3—Special Results on Bessemer Steel

Thickness, Inches	Analysis				Elastic Limit, Lb. per Sq. In.	Ultimate Stress, Lb. per Sq. In.	Elongation, Per Cent in 8 In.	Reduction of Area, Per Cent
	Carbon, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent				
0.395	0.110	0.61	0.070	0.095	40,535	64,970	27.7	54.4
0.502	0.135	0.44	0.051	0.098	41,910	64,150	29.3	54.1
0.540	0.130	0.43	0.051	0.097	38,160	64,460	27.9	55.1
0.645	0.135	0.38	0.070	0.095	39,725	61,910	27.1	52.8
0.727	0.130	0.48	0.054	0.096	40,160	64,630	28.3	46.4
0.822	0.130	0.45	0.057	0.098	40,375	64,235	28.3	46.4
0.850	0.128	0.46	0.054	0.099	40,495	64,625	27.3	46.6

the specifications for structural material for bridges, buildings, locomotives and cars contain the following clause:

For structural steel over 3/4 in. in thickness a deduction of 1, from the percentage of elongation in the 8 in. specified, shall be made for each increase of 1/4 in. in thickness above 3/4 in. to a minimum of 18 per cent.

For structural steel under 5/16 in. in thickness, a deduction of 2.5, from the percentage of elongation in the 8 in. specified, shall be made for each decrease of 1/16 in. in thickness below 5/16 in.

The bending tests required are also different for varying thicknesses.

was measured on a parallel length of 8 in., width 2 in. The results on each heat are the average of these three pieces.

Table 1 gives the results obtained on the open-hearth steel, the heats being of similar analysis, and the comparatively high phosphorus contents being obtained by the addition of ferrophosphorus in the ladle. These results are plotted in Fig. 1.

Table 2 gives the results on the ordinary Bessemer steel, and Fig. 2 shows them in diagrammatic form. Table 3 gives the results obtained on Bessemer steel slightly higher in carbon, directly comparable with the open-hearth steel. These results are plotted in Fig. 3.

The results on the open-hearth steel are very interesting, and agree in general with the conclusions drawn by Howe, Webster and Campbell. The ultimate stress decreases as the thickness increases up to about 0.6 in., but after that it is practically uniform, and does not, therefore, show the steady decrease that might be expected from Webster's table. The curve for the elastic limit descends at about the same rate of speed as the ultimate stress as the thickness increases, but when about 0.6 in. is reached instead of then remaining constant it steadily descends as the thickness rises. The elongation remains practically constant for all the thicknesses tested, but the reduction of area, after remaining comparatively uniform until about 0.6 in. is reached, then descends somewhat rapidly as the thickness increases.

The results of standard Brinell hardness tests, carried out on the cleaned rolled surface, are also plotted for information. They show no direct relation to either the elastic limit or ultimate stress, but uniformly descend as the thickness increases.

The results on the ordinary Bessemer steel, plotted in Fig. 2, are considerably dissimilar in regard to both ultimate stress and elastic limit. The former decreases somewhat as the thickness increases, but the decrease is very slight. This is also true of the elastic limit, although here the influence of the thickness is a little more marked. The elongation also does not show the effect of the increase in gage to any decided extent, but the curve for the reduction of area is very similar to that obtained with the open-hearth steel, being practically constant until a thickness of about 0.55 in. is reached, and then sinking somewhat rapidly as the thickness increases.

These results on the Bessemer steel are confirmed by those given in Table 3, obtained on steel slightly higher in carbon. A comparison of Fig. 3 with Fig. 1 is very interesting for they show the results on acid Bessemer and basic open-hearth steel of very similar analysis, the only differences being that the former is slightly higher in sulphur and phosphorus than the latter. The higher tenacity of the Bessemer steel, as shown by the elastic limit and ultimate stress, is very marked; and the lower elongation and reduction of area show that the ductility is lower.

As has been pointed out before, and agreeing with practical experience, acid Bessemer steel is noticeably "stiffer" than basic open-hearth. (In this connection see article by J. Kent Smith: "Variation in the Mechanical Behavior of Steels," THE IRON AGE, Vol. 81, p. 1010; and also one by F. W. Harbord: "Relation Between the Process of Manufacture and Some of the Physical Properties of Steel," *Journal Iron and Steel Inst.*, 1907, No. 1, p. 181.)

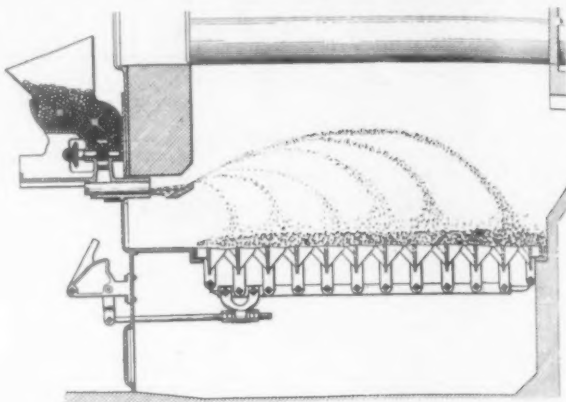
This comparison of the results on the open-hearth and Bessemer steels is also interesting as it brings out clearly the comparatively small effect of the increase in thickness on the tenacity of the Bessemer steel, some other factor evidently having a greater influence on this property than the change in gage, which factor may probably be the residual phosphorus of the Bessemer steel.

New Methods of Iron and Steel Analysis

Changes in the methods of iron and steel analysis, used by the U. S. Bureau of Standards, have been incorporated in Bureau of Standards Circular No. 14. Some of the methods considered cover both iron and ordinary steels and special alloy steels, tungsten, vanadium, molybdenum and chromium being among the elements discussed.

An Automatic Shovel Stoking Machine

A device for firing approximately $\frac{3}{8}$ lb. of coal at each charge with the fire doors closed has been developed by the Goetz Company, 403 Monadnock Building, Chicago, Ill. One aim is to eliminate the loss of heat due to open fire doors, which has been estimated at more than 15 per cent of the fuel burned, and to minimize the variation in temperature, which is not without its effect on the boiler and the setting. Owing to the small and frequent charges, it is found that fine particles of coal are burned in many cases before they reach the grate. This, of course, eliminates waste through unconsumed coal reaching the ashpit and undue



Partial Sectional Elevation of a Boiler Showing an Automatic Shovel Stoking Machine Feeding Fuel to the Fire

packing of the fuel on the grate with clogging of the air passages.

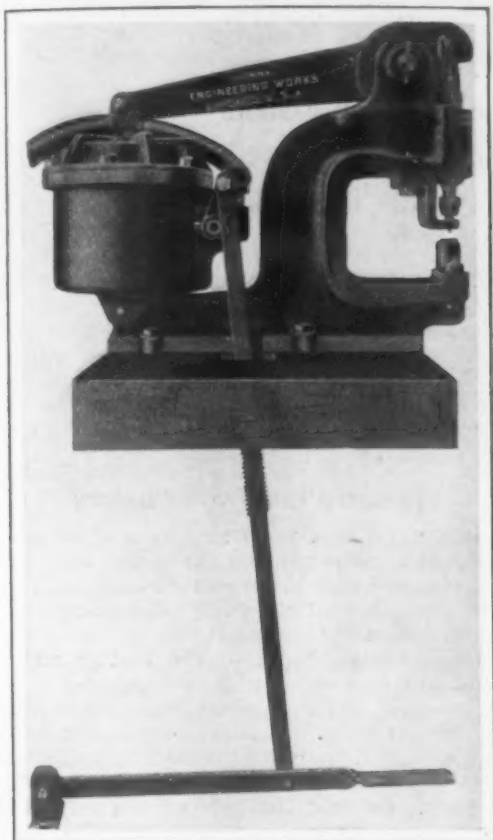
The device, which is known as the Ko-Shovel stoking machine, is installed either in the upper portion of the fire door opening or immediately above the door in the boiler front. The entering chute and plunger only measure 5 in. in depth, and where it is necessary to use the fire door opening for the installation a new door is provided. One of the points upon which special emphasis is laid is that the use of the device does not prevent the fire from being cleaned through the fire doors nor interfere with hand firing.

In operation coal is fed into a hopper having sufficient capacity to run the boiler for approximately 1 hr. The fuel, which may vary all the way from $1\frac{1}{2}$ -in. bar screenings to No. 5 washed or unwashed coal, passes from the hopper to a crusher where the larger lumps are reduced to the size that is best suited for firing. After leaving the crusher the fuel drops into the plunger chamber. The interval between the firing of successive charges is determined by the speed of the feeding mechanism, which can be varied automatically to suit any change in conditions. The firing is accomplished by a plunger operated by two heavy springs under tension. This ejects the coal, about $\frac{3}{8}$ lb. at a time, a water-cooled deflector plate of peculiar shape over which the charge passes being relied upon to distribute the fuel uniformly over the grate.

The whole mechanism is driven by a small steam engine or an electric motor. An automatic regulating valve is provided to control the amount of steam supplied to the driving engine or to regulate the speed of the electric motor. In this way the total quantity of coal fed is determined by the speed of the driving mechanism, and it is pointed out that even steam pressure can be maintained. If for any reason the feature of self-regulation is not desired, the machine can be driven from any lineshaft that is available.

Bench Punching and Riveting Machine

The Vulcan Engineering Sales Company, 2059 Elston Avenue, Chicago, Ill., is marketing a pneumatic punching and riveting machine for use in shops doing light work of this nature. While the machine is illustrated as a stationary tool for mounting on a bench,



A Pneumatic Punching and Riveting Machine Designed for Mounting on a Bench or as a Portable Tool for Light Work

it can also be supplied with a mounting that enables it to be transported about the shop.

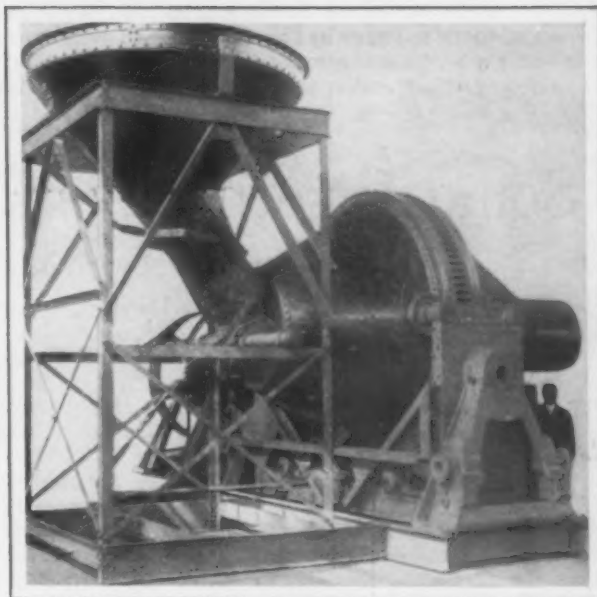
Castings are used almost entirely in the construction of the machine; steel for the frame, main lever and plunger and iron for the cylinder parts. The punching capacity is holes ranging from $\frac{3}{16}$ to $\frac{1}{2}$ in. in diameter in a $\frac{1}{4}$ -in. plate. To guard against shock after the punch has passed through the plate, reliance is placed on a special design of cushion in the upper head. Rivets up to $\frac{1}{4}$ in. in size can be driven cold. The machine consumes 1.26 cu. ft. of free air at 90-lb. pressure per stroke and weighs 225 lb.

A Large Tilting Concrete Mixer

What are said to be the largest two concrete mixers that were ever built have been supplied by the T. L. Smith Company, 1125 Thirty-second Street, Milwaukee, Wis., to the Hardaway Contracting Company, Washington, D. C. They are to be used on a concrete dam being built at Salisbury, N. C. Each has a capacity of 108 cu. ft. of mixed concrete or between 150 and 160 cu. ft. of loose unmixed material per batch.

The contract required a total of approximately 1,000,000 cu. yd. of concrete to be poured at the rate of 60,000 cu. yd. per month. While it would have been possible to have poured this amount with four 2-yd. mixers, the amount of space available precluded such an arrangement and it was decided to use two 4-yd. mixers. These machines are twice the size of any used in the construction of the Panama Canal.

Each machine is mounted on steel skids and the batch hopper used with the mixer is supported by a steel frame. Power tilting mechanism controlled by an Allis-Chalmers clutch pulley is provided for the mixer.



A 4-Yd. Tilting Concrete Mixer Which Is Believed To Be One of the Two Largest Ever Built

The drum is made of $\frac{3}{8}$ -in. steel and the inside diameter of the drum ring is $9\frac{1}{2}$ ft. The weight of each mixer complete is 46,000 lb.

A One-Piece Nesting Metal Tote Box

A shop tote box made from a single piece of metal has been added to the line of shop furniture manufactured by the New Britain Machine Company, New Britain, Conn. The special feature of the box, aside from its stiffness and lightness, is a shape that permits close nesting for convenience in transportation and storage. The boxes measure 10 x 16 in. at the top and 2 in. less each way at the bottom. When nested in a stack of a dozen they are only 18 in. high, although each individual box is 5 in. in depth.

The boxes are made of a single piece of No. 18 gage material with the exception of the handles, which are of No. 16 gage stock, folded double, bent down to afford a comfortable hand hold and fastened in place by the electric welding process, which is also used for fastening the laps and folds on the ends. The bottom is turned up to form the ends and the sides are folded over, the top edges of the stock at the sides and the ends being turned over to form a hem that is relied upon to prevent accidental injury due to careless handling. The design of the box is such that in the vicinity of the



A Group of One-Piece Construction Tote Boxes Made from No. 18 Gage Sheet Metal and Capable of Close Nesting

corners, where the strain is the maximum, four thicknesses of stock are provided as the side hem is continuous and runs over the one at the end.

The use of the raised end, it is explained, increases

the piling capacity of the box and makes more complete nesting possible, since the handle can be located in a higher position. For convenience in dragging the box around by a hook, a hole is punched in the handle.

Some Informative Data on Die Castings

Competition with Machine Work Is Strongest Feature—Dies Require Close Work and Good Judgment—How Die Castings Are Tested

JOHAN A. SCHULTZ, JR., treasurer and general manager, American Die Casting Company, Inc., Newark, N. J., gave an address before the Newark Foundrymen's Association, April 5, on the subject of die castings. He brought out many interesting points and closely held the attention of the members, despite the fact that die castings are so far removed from the gray-iron field.

In beginning, Mr. Schultz said that his subject treated, in a way, of what he termed the Foundryman's Dream," the permanent mold, but that the die casting competed only to a very small extent with the iron or brass product. Its strongest feature is its competition with machine work. In ordinary practice his company's product is made to dimensions of plus or minus 0.001 in. to each inch of dimension, and sometimes closer, though in the latter case a greater compensation for the castings is required.

SHRINKAGE OF METAL ALLOYS

One of the most important details in the production of die castings lies in constructing the dies or molds, which must provide for the shrinkage in the material from which the castings are to be made. In a die casting made of zinc base alloy, the ordinary shrinkage is about 0.004 in. per inch of dimension, which indicates the care required in making the dies or molds. If the casting has many cores the shrinkage varies, and only experience can judge as to the variances.

The dies are not, as a rule, made of a hardened high carbon steel, although that is the general belief. Mr. Schultz said that hardened steel being under internal strains, repeated heating and cooling in the course of casting would cause it to crack, therefore a special alloyed machinery steel was usually used for this purpose.

The cost of dies, as might be expected, is considerably more than wooden or metal patterns, some dies requiring months to construct. A properly constructed die will produce upward of 100,000 or more duplicate castings, and each piece with the same degree of accuracy, so that when its cost is distributed over the number of castings it will produce, the die cost per casting is small.

METHOD OF TESTING CASTINGS

To determine the soundness of the castings, Mr. Schultz explained, the first made is carefully broken in a canvas bag. If it is defective, others are broken until a perfect one is found. The pieces of the perfect casting are then used as a weight on a scale and subsequent castings must balance the broken casting perfectly. By this method the smallest blow-hole is shown to exist.

In sketching the history of the die-casting industry Mr. Schultz said it owed its inception to the desire of an inventor in 1892 to place on the market a small toy typewriter, for which it was necessary to produce small and intricate parts at a very low cost. The inventor perfected a machine to produce these parts and applied for a patent in 1893. The commissioner of patents, however, was skeptical regarding certain claims, and it was not until 1895 that a patent was allowed. Thomas A. Edison was among the earliest to realize the possibilities of die castings, and was one of the first to place large orders for them for use in constructing the talking machine.

The speaker referred briefly to the alloys used as the zinc base, tin base, lead base and aluminum, all with their various mixtures, having their respective merits. He incidentally compared the cost of No. 2X foundry iron with that of a zinc alloy used in die castings, the latter costing approximately \$450 a ton. Very successful results have been obtained with aluminum alloys in making die castings; but the speaker believed that its field is still somewhat limited and more accurate results are obtained with metals subject to less shrinkage.

INSERTED PARTS TO REINFORCE

He explained that when zinc base alloys are used the walls of a casting should not be less than 1/16 in. in thickness, although in the softer metals, such as lead and tin base alloys, the walls of the casting may be made approximately one-half this thickness or less if desired. Certain parts of the casting which are subjected to severe strain may be reinforced by inserting therein pins, bushings, rings or flat pieces of brass, bronze, iron or steel. In many instances it has been found impractical to cast threads in small holes, as they can be cut more cheaply and the result is just as satisfactory. He said that plain holes from 0.01 in. in diameter and upward can be successfully cast as a commercial proposition.

Mr. Schultz did not believe that brass die castings are being produced in a profitable manner at the present time, as it is difficult to get a die or mold material which will stand the constant heat required, and retain its accuracy. The yellow metals are cast at 1700 to 1800 deg. Fahr. He did not go far into the types of machines used in die casting, but described them briefly as being of the plunger or hydraulic type, where the metal in the pump cylinder is under pressure only at the time of casting; the air type, where there is a constant pressure on all the metal contained in the pot, and the centrifugal machine, with which by centrifugal force the metal is made to fill the mold. The plunger type was described as the most popular. A vacuum process has been often advocated, and while theoretically a very good thing, in practice it presents many difficulties.

CASTINGS NOT SOLD BY WEIGHT

Die castings are generally not sold by weight, inasmuch as the labor varies in both the making of the dies and the castings, and as a rule the die cost is treated as a separate item from that of the castings produced therefrom. One thing which is to be considered in the production of die castings is the drossage loss where a great many small pieces are made, this loss diminishing in ratio with the speed used in utilizing the hot metal.

At the end of his address, he remarked that the members of the association were welcome to inspect the plant of the American Die Casting Company. He said that the principal secret of the die-casting industry, like that of every industry of importance, was experience, and that it could only be obtained in the same manner in which all of the successful die-casting manufacturers had obtained theirs, namely, by tireless effort combined with skill, patience and sufficient capital.

H. P. Macdonald, Snead & Co., president of the association, asked if the dies were coated to prevent the

metal from adhering to them, to which Mr. Schultz replied that they were sometimes coated, but not for that purpose. He explained that the dies were treated on the surface to produce a certain finish which, however, was only to improve the appearance of the casting itself. Die castings can be plated, enameled or otherwise coated. In answer to another question, he explained that the dies and the metal were kept at certain temperatures, varying with the different alloys, so as to assist in controlling the shrinkage of the casting.

DRAWING OF CORES IMPORTANT

Replying to a question asked by George Krouse, brass founder, Jersey City, N. J., Mr. Schultz said that more than one casting at a time was frequently made in the same die, but that duplication depended largely on the number of cores to be withdrawn. No difficulty was experienced where the cores would draw from one side only, and did not cross each other. In some molds as many as 40 or 50 impressions of small, plain castings are made.

In the discussion it was brought out that the molten metal in the machines used by the American Die Casting Company is under a pressure of approximately 1000 lb. per sq. in. in the die itself, but that the pressure is not applied until the die is filled. It was also pointed out that, because of the high pressure involved, the cores must be securely locked in their respective positions, otherwise they would shift during the casting operation and the product would be rendered valueless for accuracy.

The association renominated the board of officers which has served the past year. R. E. Jennings, 2d., of the Hewitt Steel Corporation, Newark, N. J., was elected to membership.

Selecting a Molding Sand for Various Metals

The size of the casting as well as the kind of metal used in the casting must be considered in selecting a molding sand, in the opinion of C. Powell Karr, associate physicist U. S. Bureau of Standards, Washington. In "A Preliminary Report on Molding Sands" presented at the last annual meeting of the American Institute of Metals, he characterized the proper sands for different metals as follows:

Sands for steel casting should contain 97 per cent or more of silica, with a small amount of clay for bonding purposes.

Sands for iron casting should be loamy, and their texture varies with the size of the casting.

Sands for bronze should be of fine grain, good bonding power and should have a high degree of permeability—a rather difficult combination.

Sands for brass and aluminum should be fine grained and loamy, similar to those used in molding stove plate, and they should also possess a good degree of permeability.

The permeability, he said, may be expressed by the time of flow of 100 cc. of water through 100 cc. of sand in a vessel of the specified dimensions. This time may be 2 min. plus or minus 5 sec., in a sand of good permeability. Such a sand, other conditions being equal, would be adapted to almost all grades of bronze and ordinary brass. For German silver a greater degree of permeability would be almost necessary.

The durability or life of a sand is a matter of great economic importance. Very little of practical value has been done on the study of this subject. The Bureau of Standards, he explained, intends to conduct a series of researches on the life of various molding sands by actual molding tests, conducted with various metals and poured at different temperatures.

It has been suggested by various investigators that a good molding sand could be artificially prepared by crushing fine quartz, or obtaining fine quartz sand and adding a sufficient amount of clay and other bonding elements to give it the proper degree of cohesiveness; but the difficulties in the way of coating each grain of quartz with a film of clay of uniform thickness, Mr. Karr notes, would seem to make the problem almost

unsurmountable; and yet, as natural molding sands become exhausted, its production may some day be of great economical importance. It might be possible to produce in this way several standard sands having every desirable physical property for specific purposes, which could serve as standards with which all natural molding sands now in use could be compared.

Coming Supply and Machinery Conventions at Pittsburgh

Local committees at Pittsburgh are making extensive preparations for the entertainment of the delegates to the triple convention of the Southern Supply and Machinery Dealers' Association, whose headquarters are at Richmond, Va.; the National Supply and Machinery Dealers' Association, with headquarters at Cleveland, and the American Supply and Machinery Manufacturers' Association, having headquarters in New York. The convention will be held in the William Penn Hotel, in Pittsburgh, on May 10, 11 and 12. The convention of the American Iron, Steel and Heavy Hardware Association, whose headquarters are in New York, will be held in the William Penn Hotel on May 24, 25 and 26. Committees for the two conventions have been appointed as follows:

Convention Committee: H. P. Bope, Carnegie Steel Company, chairman; George T. Bailey, Oliver Iron & Steel Company, vice-chairman; Charles J. Graham, Graham Nut Company, vice-chairman; Charles L. Wood, Carnegie Steel Company, secretary; G. E. Benson, National Tube Company, treasurer.

Committee chairmen have been named as follows: Automobiles, J. E. McLain, Cambria Steel Company; Banquet, A. M. Harper, Carnegie Steel Company; Finance, H. B. Wheeler, American Sheet & Tin Plate Company; Hospitality, J. M. Hansen, Standard Steel Car Company; Ladies' Entertainment, C. M. King, McKinney Mfg. Company; Publicity, E. S. Rooney, Youngstown Sheet & Tube Company; Reception, J. F. Hazen, Pittsburgh Steel Company; Speakers, W. L. Rodgers, Pittsburgh Gage & Supply Company; Dinner Vaudeville, W. W. Sanderson, Carborundum Company.

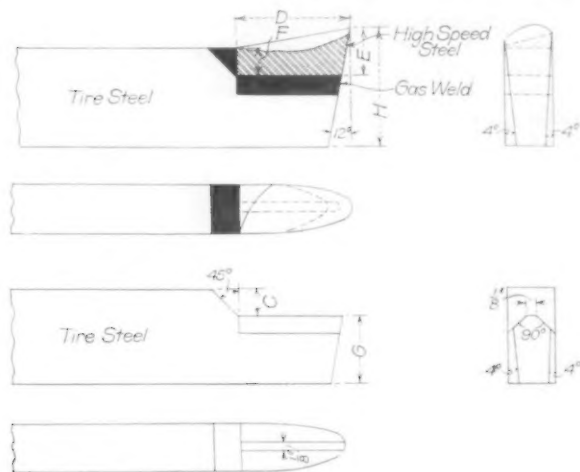
In addition to the above, a general committee has been appointed consisting of one or more members from each of the larger manufacturing concerns in the Pittsburgh district. These committees have been formed for the entertainment and business sessions of all the conventions and manufacturers of Pittsburgh have contributed liberally. A very complete program for the entertainment of the delegates, many of whom will be accompanied by their wives, has been arranged, and the sight-seeing tours will include visits to some of the largest manufacturing plants in the Pittsburgh district. It is expected the conventions will be very largely attended. The business sessions will be held in the convention hall of the William Penn Hotel.

On the occasion of the formal opening of the new plant of the Hamilton-Beach Mfg. Company, Racine, Wis., on March 18, Frederick J. Osius, president and general manager, announced the institution of a profit-sharing plan for all employees and the establishment of an electrical school for employees, to occupy a separate building adjoining the plant as soon as it can be erected. The profit-sharing system follows the outline of that in effect at the Ford Motor Company's works, Detroit. The main building of the new plant is 50 x 300 ft., three stories and basement, and is considered a model of modern daylight construction. The power plant was installed as a unit by the Allis-Chalmers Mfg. Company, Milwaukee.

San Francisco advices state that seven American freighters, manned by American crews and flying the flag of the recently organized \$10,000,000 Oriental Alliance Steamship Company, are to be placed on the run between San Francisco and the Orient, according to Peter D. Malloy, president of the company. The company will later operate two boats between New York and San Francisco through the Panama Canal. All the boats will be transferred from Atlantic waters.

Producing Lathe Tools Autogenously

At the Topeka shops of the Atchison, Topeka & Santa Fe Railway Company, E. J. McKernan, supervisor of tools, has developed a system for welding high-speed steel to carbon steel. The oxy-acetylene process is used and tools are made for lathes, planing machines and general metal cutting work. Tire steel is ordinarily used for the main body of the tool and the high-speed steel is welded on for the cutting edges. The arrangement of the shank, the



Lathe and Planing Machine Tools Made by the Autogenous Welding of a High-Speed Steel Tip to a Shank Made of Carbon Tire Steel

welded portion and the Norway iron facing is indicated in the accompanying drawing, while the dimensions of the tools and the welded portions are given in the table.

Before the weld is made the scale is removed from the tire steel forming the shank to give a clean surface, and the same is done for the high-speed steel tips. The latter are then heated to 1800 to 2000 deg. Fahr. and are faced with Nor-

Table of the Various Sizes of Lathe and Planing Machine Tools Produced by the Autogenous Welding Process. Dimensions are in Inches and Letters Refer to Drawing

Size	C	D	E	F	G	H
1/2x1 x 8	3/4	1 1/2	1 1/2	3/4	5/8	1 1/2
5/8x1 1/4 x 8 1/2	3/4	1 1/2	1 1/2	3/4	7/8	1 1/2
5/8x1 1/2 x 8 1/2	3/4	1 1/2	1 1/2	3/4	1	1 1/2
3/4x1 1/2 x 9	3/4	1 1/2	1 1/2	3/4	1 1/8	1 1/2
3/4x1 3/4 x 9 1/2	3/4	1 1/2	1 1/2	3/4	1 1/8	1 1/2
1x1 1/2 x 10	3/4	1 3/4	1 3/4	3/4	1 1/8	2
1 x2 x12	3/4	2	2	3/4	1 1/8	2 1/2
1 1/4x2 x14	3/4	2	2	3/4	1 1/8	2 1/2
1 1/2x2 1/4x18	3/4	2 1/2	1 1/4	3/4	1 1/8	2 1/2
2 x3 x20	3/4	3	1 1/2	3/4	2 3/8	3 3/8

way iron where they come in contact with the shank. The shank and the tips are forged as shown to approximately the proper dimensions before the weld is made. This work is done in the blacksmith's shop, but an expert welder is employed for uniting the two pieces. After the weld has been made the tools are ground to the proper shape by a tool grinder.

The process allows practically all small pieces of high-speed steel that have become too short for ordinary machine use to be utilized. With the exception of possibly some small chips that are removed when the tips are being forged, none of this material is scrapped. The cost of these tools as compared with solid ones of high-speed steel is, of course, greatly reduced, the estimated saving being about half the price of a solid tool.

After the tools are finished according to the standard shape used, they are sent out to the various shops of the company from Topeka. The plan is said to be entirely satisfactory, it being practically impossible to tell where the weld is made and the performance compares favorably with the former solid tools. On the wheel lathes it has been possible to turn out 250 pairs of coach wheels with one set of the largest tools given in the table. The cutting speed in this case is the same as that formerly used with the solid tools.

In several cases the tip has broken down, but in each case it has been possible to redress it in the blacksmith shop in practically the same manner as a solid tool. In redressing the tools they are drawn down beneath the part where the tip is welded on to the extent of approximately 1/4 in. below the bottom or parallel surface of the tool. After this has been done the tool is placed under the steam hammer and a blow struck directly back of where the high speed steel is welded to the shank. In this way the point of the tool is forced back to the proper position and the proper shape given to it. This work has been accomplished in every case without the tip becoming loose on the shank.

Swedish Lack of Ferromanganese and Other Materials

Disorganization in the Swedish iron and steel industry is still intense, the trouble being due to inability to procure enough coal, ferromanganese and silica brick to keep plants running, according to the London Ironmonger. Frequent shut-downs have taken place, but relief is expected because the British Government has granted licenses for shipment of such supplies to Sweden. Swedish manufacturers now demand guarantees of return cargoes of coal, etc., before they ship iron and steel to England. These licenses for shipping coal to Sweden are granted only on the condition that it shall be used in making steel and iron for resale to Great Britain. The shortage of silica brick in Sweden is serious, the domestic supply being entirely inadequate, and Great Britain seems to be the only other source.

A sharp rise in quotations for Swedish steel and bar iron has taken place lately as the result of causes independent of high freight rates and other abnormal conditions, the cost of production rapidly advancing with no prospect of a recession should an early peace be declared. British importers, the middle of March, were quoting £32 for high-grade billets in Sheffield which were £11 before the war and from £22 to £24 for bar iron for making crucible steel. Swedish pig iron has advanced to £11 per ton.

The Woodard Machine Company, Wooster, Ohio, of which L. A. Woodard, formerly general manager of the William Tod Company, Youngstown, Ohio, is president, has purchased the foundry of the Foundries Company, Orrville, Ohio, which includes a brick molding shop, 60 x 180 ft., and a power plant. Castings will be made at the Orrville plant and machined at the Wooster plant. The Woodard Company has a large amount of business booked, including orders for machinery to be used in a new process of separating the elements of crude oil for chemical manufacture. Gears will also be manufactured.

The Pennsylvania Forge Company, Philadelphia, Pa., has purchased the plant of the Fleming Engineering Company, 1011 Master Street, Philadelphia. It is announced that April 15 Wilmot Fleming will assume his duties as superintendent of the new machine shop which the Forge Company has just completed.

The Zenith Furnace Company, Duluth, Minn., has plans for adding 30 by-product coke ovens to its present battery.

THE GREATEST IRON-ORE YEAR

NEW OPERATIONS

Preparations in the Lake Superior Region for Record Mining and Shipping

MARQUETTE, MICH., April 10, 1916.—Within the next two weeks iron ore should again be moving from the mines of the Lake Superior district to lower Lake ports, as the warm weather of late has done much to break up the ice in the harbors and in the St. Mary's River. The operators and the vesselmen are exceedingly anxious to start the season's work, as there is a lot of ore that will have to go down the Lakes during the year. Many estimates have been made as to the amount that the boats will handle this year, the guesses ranging all the way from 55,000,000 to 70,000,000 tons. It is quite certain that the fleets can handle as much as 70,000,000 tons, and a fair estimate would place the movement at 60,000,000 tons. If the boats can get an early start and are able to operate late in the fall, it is thought that 60,000,000 tons, or close to that amount, can be handled.

The Steel Corporation took action early last fall and chartered a large number of vessels for this year (probably 10,000,000 tons capacity) in addition to the fleet of 73 ships which it owns. Some of the other mining organizations that do not have fleets of their own followed suit and signed contracts. A few, however, who were not so forehanded will have trouble moving their ore. The carrying rate has been advanced five and ten cents per ton for this year. Mines that have not been operated in years are now being placed in condition for production again, and the president of one of the leading mining companies stated a few days ago that he would open up every property his company held. Although the operators will receive 75 cents more a ton for their ore this year than in 1915, they are not at all satisfied with the price, as the advance has not kept pace with the advances in pig iron and steel. Rail and lake freights have been advanced; miners are commanding higher wages; materials are higher; in fact, nearly everything that enters into the cost of placing ore at lower lake ports has gone up, and the operators will receive only 25 or 35 cents more for their product than they did in 1915. Of course, a lot of old ore piles that have been waiting for years are going to be moved, but at that the operators are not able to make a profit proportionate to that of the furnaces and mills.

LABOR CONDITIONS

Mines are being opened up on all of the ranges, and it is certain that there will be a shortage of skilled labor before the season advances very far. Many miners have left the district for the copper camps of Montana and Arizona, having been attracted by the high wages being paid there. The iron companies advanced wages several months ago, but apparently not in proportion to the Western copper mine advances. There is plenty of common labor in the district, but miners are in demand and have no trouble getting employment. New underground and pit properties are being opened as never before.

The Steel Corporation has been busy stripping several properties on the Mesaba range in Minnesota, but will not have any new producers in the Michigan field this year. The Great Northern Ore Company, which took over the Hill properties that the Steel Corporation released, will have a busy year. Several mines are being put in readiness for mining, while all of the old mines will be worked. The Cleveland-Cliffs Iron Company, one of the largest of the independents, is sinking three shafts on the Marquette range and recently acquired a lease of a property on the eastern Mesaba. This company has disposed of 3,200,000 tons of ore for delivery this year, nearly all of which is non-Bessemer; in fact, the company has succeeded in selling only about 85,000 tons of Bessemer ore. The demand for low-phosphorus ore is not great just now, the furnace companies not caring to pay the premium asked for the best Bessemer grades. This is a condition that has not existed in some time, as the Bessemer ores are usually the first to be taken.

Michigan will have more open pit mines shipping this year than in any year. The Wakefield, the largest pit in Michigan, which shipped over 600,000 tons in 1915, will send out over 1,000,000 tons this season. The Hanousack, a new pit mine, is being opened close to the Wakefield. Stripping has been going on all summer with a 315-ton shovel, which worked to such good advantage on the Mesaba last summer. Large ore deposits have been uncovered in the Wakefield district and there are a number of drills now at work there. It is considered the most promising field in Michigan at this time. M. A. Hanna & Co., who operated few of the mines in 1915, will have all of them working before long. The same is true of the Republic Iron & Steel Company and many other operating concerns.

Several new concentrating plants will be in operation in Minnesota this year. The Cleveland-Cliffs Iron Company built a plant at its Crosby mine last fall and it will be started shortly. The Shenango Furnace Company recently let a contract for a plant at its Webb mine. There are now about ten mines in Minnesota where the waste material is removed from the ore by washing before it is shipped. The concentrates find a ready sale, being greatly desired by the furnaces. A party of Eastern men have erected an experimental plant in Duluth and are endeavoring to work out a method for treating the low-grade magnetic ores that are so abundant on the eastern part of the Mesaba range. The work is being conducted by Dwight E. Woodbridge, a well-known mining engineer. Magnetic separation has never been experimented with to any great degree in the Lake Superior district, although there are mines in other regions where processes have been developed that are giving results.

The mining men are going to be so busy this year that the annual meeting of the Lake Superior Mining Institute, which is scheduled to take place in August, will probably not be held until next February, when a trip will be made to the Birmingham district of Alabama, with a side trip to New Orleans.

Preparedness Campaign by Chicago Engineers

A group of prominent engineers and contractors of Chicago and vicinity have co-operated in forming a joint committee on military engineering. The founders are members of all of the leading engineering and contracting organizations of Chicago, including the local branches of the national engineering societies. The purposes of the committee are to further military preparedness among engineers, contractors and their associates by the following means:

1. Courses of lectures.
2. Assigned reading.
3. Studies and practical instruction in military engineering.
4. Assisting engineers to qualify as officers in the national reserve corps of civilian engineers.
5. Urging enlistment in and support for engineer troops of the National Guard and such other organizations as the Government may create.
6. Furthering instruction in military engineering in training camps and the attendance in them of those qualified.
7. By such other means as from time to time may be deemed advisable.

The committee has prepared a program covering the vital points outlined. To date the program is practically complete for a period extending from April 20 to July 25. Something of interest will be taken up each week, including lectures by Lieut.-Col. W. B. Judson, Major P. S. Bond and Lieut.-Col. Mason M. Patrick, all of the Corps of Engineers, U. S. A., and several exhibition drills, terrain exercises and inspection trips under the direction and guidance of various officers of the engineer troops of the Illinois National Guard.

The directors of the joint committee are: Wharton Clay, chairman; Robert W. Hunt, vice-chairman; Robert F. Hall, secretary-treasurer; Bion J. Arnold, W. W. De Berard, J. de N. Macomb, Jr., H. S. Baker, Robert I. Randolph and Vernon C. Ward, Jr. Correspondence should be addressed to the secretary, Robert F. Hall, 111 West Washington Street, Chicago.

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Rails a Minor Product

The statistics of rail production in 1915, compiled by the American Iron and Steel Institute and presented elsewhere in this issue in some detail, must furnish a surprise to those who had not already estimated the production at a relatively low figure. The total was 2,204,203 gross tons. While there is an increase from 1914 of 259,108 tons, or 13.3 per cent, it must be remembered that pig-iron production at the same time increased 28.2 per cent. In fact, in 1915 the production of rails constituted a smaller proportion to the production of pig iron than in any other year on record. The statistics go back to 1867, in which year the rail production of 412,596 tons (of which more than 99 per cent was iron) was equal to 31.6 per cent of the tonnage of pig iron produced. In 1906, the year of maximum rail production, 3,977,887 tons, the proportion was 15.7 per cent, while last year the proportion was only 12.7 per cent. The rail tonnage was only 55 per cent of the maximum, recorded nine years earlier.

The year 1915 was somewhat notable in an unfortunate way, in that 78,525 tons of rails were imported, chiefly from the Algoma works in Canada. This was the highest import total since 1887, barring the 95,555 tons of 1903. Maximum rail imports, chiefly iron, occurred in 1871, 505,537 tons. The rail exports last year were 391,491 tons, indicating an apparent consumption in the United States of 1,891,237 tons. The production of girder and high T rails for electric lines was 133,965 tons, while the production of light rails, under 50 lb. to the yard, was 254,101 tons. Only a very small proportion, doubtless, of the girder and light rails was exported, and a considerable tonnage of standard rails was used at various industrial plants, and it may therefore be assumed that the consumption of rails by the regular steam roads was less than 1,500,000 tons. This, however, is not surprising even though the steam roads consumed more than 3,000,000 tons in 1906, for the *Railway Age Gazette* has already reported that in 1915 only 933 miles of new main line track was laid, with 65 miles of second, third and fourth track, making 998 miles, whereas in 1906 there was an increase of about 13,000 miles in new track. The difference of 12,000 miles would account for precisely 1,500,000 tons, if computed on the basis of an average of

80 lb. per yard for the rails which were thus used.

As a matter of fact, it is probable that the rail replacements in 1915 were adequate. While the freight ton-mileage has increased by fully one half from 1906 to 1915, there were rails wearing out ten years ago, not on account of the aggregate volume of traffic, but because a large proportion of the rails then in service were too light in section for the recently increased weight of cars and locomotives. Given the present volume of traffic and rails of adequate weight, it is improbable that the annual wear would involve much more than a million tons of rails, but conditions such as obtained ten or a dozen years ago, of the rolling stock being too heavy for the rails, are again appearing. Some of the great systems have been trying the 125-lb. rail, on account of their heavy locomotives and the "battleship gondolas" of 140,000 lb. capacity. As a matter of fact, the production of rails 100-lb. and over in 1915 was no less than 688,995 tons, or 35 per cent of the total of rails over 50-lb., and yet the average weight of all the rails in steam road service to-day is probably somewhat under 85 lb. per yard. If in nearby years there is a heavy tonnage of rails used for replacement it will be for the purpose of providing heavier rails rather than to replace rails of a section suited to the service. As indicated, it should not require much more than a million tons of rails a year to take care of normal wear.

The disappearance of the electric steel rail in 1915 is to be noted. There were 3455 tons of electric steel rails produced in 1912, 2436 tons in 1913 and 178 tons in 1914, but no production in 1915. The industry may be revived when time has been allowed for testing fully the electric rails already put into service. The rail made of titanium-treated steel has likewise been on the decline, from 256,759 tons in 1910 to 21,191 tons in 1915. The other alloyed steel rails in 1915 were confined to 24,970 tons reported as manganese rails. The trend seems to be markedly toward the plain open-hearth rail, which comprised 99 per cent of the rails 100-lb. and over, 80 per cent of the rails 85 to 99 lb. and 59 per cent of the rails 50 to 84 lb. The total rail production was made up of 1,775,168 tons of open-hearth, 326,952 tons of Bessemer and 102,952 tons rolled from old steel rails and renewed rails, which the manufacturers could not classify, whether Bessemer or open-hearth.

Export Steel Prices

A noteworthy point in the statistics of iron and steel exports as presented from time to time is that while the maximum tonnage for a month was that reported for last August, the total value of all iron and steel exports has continued to increase. The exports of the tonnage items last August amounted to 406,000 gross tons, dropping to 382,000 tons in September, and averaging a trifle less than 360,000 tons a month since then, the January exports amounting to 357,000 tons. While the value of all iron and steel exports last August was \$37,726,822, there has been an increase every month since then except in December, and the value stated for the January exports was \$51,643,807. Thus the tonnage exports were 10 per cent less in January than in August and the stated value of all iron and steel exports was 37 per cent greater.

This increase in value was due largely to greater exports, and higher priced exports, of the iron and steel commodities not returned by weight. Thus unloaded shells, which are included in "all other manufactures of iron and steel," with only the value stated, have undoubtedly increased quite largely.

In order to determine how much the stated value of the tonnage exports has increased in the period for which returns are available, we have computed the percentage increase per pound or per ton, from January, 1915, to January, 1916. Inasmuch as the lowest prices in the domestic market were reached in December, 1914, the exports in January, 1915, may be regarded in general as representing approximately the low point. The exports in January, 1916, however, cannot have represented recently going prices, as shipment on orders was delayed by the freight congestion. The following table is prepared by dividing the weight of material into the total value stated, for each January, and then computing the apparent percentage increase in unit value:

	Per Cent Increase		Per Cent Increase
Pig iron	77	Galvanized sheets.....	36
Scrap	54	Black sheets	19
Wire rods	16	Plates	16
Steel bars	35	Structural material.....	2
Billets, etc.	122	Tin plate	12
Nails	19	Barb wire	42
Wrought pipe	16	Other wire	42
Rails	17		

Of course, it must be recognized that the character of the exports changed greatly from one January to the next. The tonnage was multiplied two and one-half times, and thus there is room to infer that the character of the material changed more or less. There may have been larger proportions of higher or lower class material in the exports last January than in those of a year earlier. The divergences would perhaps not be very great, however, in the averages.

The striking feature of the showing in the table is the smallness of most of the advances. They reflect nothing like the advances that have occurred up to date in the domestic market, but it must be remembered that a large part of the advance in the domestic market has occurred since Jan. 1; furthermore, it is doubtless the case that while as a rule export orders are placed for prompt shipment the rule cannot be followed when the mills are filled up or when shipping facilities cannot be secured.

Most of the products listed show advances of between 15 and 20 per cent, and the conclusion may be drawn that the orders were placed several months before the shipments were made. Structural material shows practically no advance, doubtless a reflection of the fact that structural material has been slow in the domestic market, advancing chiefly by reason of the general scarcity of steel.

The reported price of billets, ingots, blooms, etc., more than doubled, the increase shown being 122 per cent. It may be assumed that the orders for unfinished steel were placed for quick shipment; possibly, also, there was a larger proportion of high grade steel in the later business.

The general conclusion to be drawn is that even if the tonnage of exports does not increase materially in the next few months the values will continue to increase. Rods, for instance, are not likely to go out in future at less than double or triple their price in December, 1914.

Powdered Coal and the Open Hearth

It has been said that the future open-hearth furnace will have no regenerators. It has now been proved that such a furnace is a commercial success. The American Iron & Steel Mfg. Company, which for months has been conducting tests with different forms of powdered coal burners on open-hearth furnaces, has made public through its chief engineer results of recent pioneer work. This contribution is reviewed at length in this issue, and is an addition to the literature of fuel engineering that can hardly be overestimated. With results backed by tests on a large scale, the findings have great weight. Besides working on the open-hearth furnace, the company has perfected burners and coal feeders, and applied them to heating and puddling furnaces and to soaking pits for ingots.

The success appears to be due largely to the development of both high-pressure and low-pressure burners, and a combination of them under careful control in connection with a combustion chamber so that the heat is developed where it is needed and with minimum furnace losses. Mr. Gadd, who, it is understood, is responsible for the later burners and coal feeders, emphasizes the fact that the heat absorption occurs through radiation from the incandescent coal particles and not by convection, and thus large volumes of air within the furnace do not require heating to the combustion temperature. With the path of the flame always in the one direction, given parts of the furnace remain at substantially the same temperature, and an important part of the furnace installation is an equipment of waste-heat steam boilers. He reports a steady evaporation of 6¼ lb. of water per pound of coal burned at the furnace. If one puts good average boiler performance at 10 lb. evaporation per pound of coal, he may charge the steam-making plant with 62½ per cent of the coal, leaving only 37½ per cent chargeable to the furnace.

The author admits that the fuel consumption is high. Incidentally in presenting the paper, he said informally that heats had been taken from a 35-ton furnace in 8½ hr., and that the coal consumption was 475 lb. per ton of steel and in other cases with cold charges less than 600 lb. These furnaces, it is understood, had burners at opposite ends and

were equipped with regenerators and operated under the usual reversals. The fuel cost is considered to be more than offset by the first cost of the furnace as ordinarily constructed and by its cost of upkeep. In such a comparison it must of course be kept in mind the improvements in gas-passage arrangements being constantly made, which aim at increased life of brick-work and diminished gas leakage. Then there is the author's own word of caution that the personal element in the control of powdered coal is all important; but he suggests how this possibly may be partly eliminated. Finally, there is a belief in some quarters that relatively scarce coals of only 3 to 5 per cent ash are essential to complete success, or in other words the available coal supply is narrowed too much for the general application of the method.

The Literacy Test Again

There could be 44 defections from the ranks of those who voted for the Burnett immigration bill, with its literacy test, in the House on March 30, without preventing the bill from being passed over a Presidential veto, as the vote was 307 to 87, and a vote of 263 to 131 would still be a two-thirds vote. The bill must still pass the Senate before the President has the opportunity to show whether he has changed his mind since he vetoed a similar bill somewhat more than a year ago.

American manufacturers, particularly those making iron and steel and coke, will have great difficulty in understanding the argument urged in favor of the bill—that the end of the war threatens a flood of immigration. They are convinced that a flood of such immigration, if it could be started at the present moment, would be a benefit to the United States. That the flood would tend to rise is extremely improbable, for various reasons, but if it did the fact remains that it would have a prolonged drought to balance. There has now been a period of 20 months of extremely limited immigration. Counting all persons entering and leaving the United States from July 1, 1914, to March 1, 1916, the increase in population has been 1,050,000 less than would have been the case if the movement had been precisely the same as obtained in the two years prior to July 1, 1914. That is a deficiency in population which the country is facing at a time when domestic and foreign buyers are clamoring for more merchandise. Each month that the war is prolonged aggravates the situation. The deficiency in population grows, and the longer it grows the greater would have to be the flood of immigration which would turn the labor situation in the wrong direction.

What the immigrants do is well known. They do not become school teachers, for instance. Many of them work in mills and factories, at blast furnaces and at coke works. They do work that the organized labor forcing this bill through Congress does not want to do, and would not do unless conditions were almost inconceivably changed. To change them thus, as by the change from two to three shifts per day at the blast furnaces and steel works, would be to throttle the industry, and for what good to the nation?

We have had this immigration and have prospered, as a nation, with it. To show that a restriction in immigration, under normal conditions—to say nothing of when there is a scarcity of labor—is beneficial, would be extremely difficult. To show that the restriction that would be imposed by a literacy test would be advantageous, in the circumstances and considering the work immigrant labor does, is altogether impossible.

Given this literacy test, however, there is one thing that follows as directly as day follows night, and that is that the tariff protection on iron and steel products should be greatly increased. However inadequate the present tariff may be to meet ordinary conditions, the situation resulting from the kind of immigration curtailment hoped for by the advocates of this measure would mean untold damage to the iron and steel industry. Whether the restriction would occur, whether the requirement of ability to read 30 words in any language or dialect which the subject selects would restrict immigration seriously, is not the immediate point. The advocates of the bill assume that it would, or they are wasting their time. If immigration is to be restricted, the whole basis on which the iron and steel and some other tariff schedules are now supposed to rest must be radically changed. The feared "flood of immigration" is in all probability altogether imaginary. The flood of relatively cheap iron and steel would be real and crushing.

The Benzol and Toluol Market

An increasing output of benzol, toluol and allied products is being made by steel and iron companies, and it is estimated that the yearly production of benzol is now not far from 25,000,000 gal. Most of this has been contracted for and sold to powder makers principally, the benzol being converted into picric acid and the toluol into trinitrotoluol, both the basis of powerful explosives.

The market for benzol on contract is firm at 70c. to 75c. per gallon, producer's plant, with spot benzol commanding 80c. to 90c. The spot market is dominated largely by resale product, some of which has accumulated in the hands of buyers who have been unable to consume it as early as they expected. There is little interest in contracts except for 12 months, with scarcely any to offer at that. Toluol is quoted at \$4.50 per gallon, producer's plant, on contract and at \$4.75 to \$5 for spot. There is practically no contract market, and supplies are very small. Solvent naphtha, or xylol, is selling at 40c. to 45c. per gallon on contract and 45c. to 50c. per gallon for spot, at producer's plant, with the supply and demand about balanced. The market for sulphate of ammonia is quiet, most of this being sold on yearly contracts made in May and June. Spot sulphate is commanding \$3.45 to \$3.50 per 100 lb. at Atlantic ports. The war having interfered with imports from England, the demand for the domestic salt has increased decidedly.

Fairbanks Transfer Completed

The transfer of E. & T. Fairbanks & Co., scale manufacturers, St. Johnsbury, Vt., to Fairbanks, Morse & Co., Chicago, Ill., has been completed. C. H. Morse, Jr., W. E. Miller, H. J. Fuller, Thomas McMillan and W. S. Hovey of Chicago have been elected directors, succeeding Henry C. Ide, Joseph Fairbanks, A. E. McLeod, Charles A. B. Pratt and C. L. Harpham of St. Johnsbury. The directors have elected Frank H. Brooks, St. Johnsbury, president; C. H. Morse, Chicago, vice-president; John C. Clark, secretary; Fred C. Beck, treasurer.

Government Equipment of Munitions Plants

Private Manufacture Highly Desirable and Appropriations Are Proposed Which Will Encourage It in Aid of the Army

WASHINGTON, D. C., April 11, 1916.—A new departure in the Government's policy, originated by the War Department and strongly urged upon the House and Senate appropriation committees by Mr. Garrison, when Secretary of War, and by General Crozier, chief of the War Ordnance Bureau, is reflected in the fortifications appropriation bill which has just been reported to the House. This important measure, which for the past five years has carried an average of about \$6,000,000 per annum, now authorizes expenditures approximating \$22,000,000 and specifically directs the adoption of a plan designed by General Crozier to secure the prompt co-operation with the Government of private manufacturers of war material to meet any serious emergency. While the scale upon which the plan may be utilized is not large, it is nevertheless a substantial advance and is in striking contrast with the policy of the Navy Department as exemplified in its campaign to secure a Government armor factory and to eliminate private shipyards as far as possible in developing the construction program of the national defense project.

DETAILS OF GOVERNMENT EQUIPMENT

A specific provision of the fortifications appropriation bill is a proposal to equip at Government expense a number of private plants for the manufacture of artillery, ammunition, etc., on the basis of equitable contracts which will insure the maintenance of the equipment at all times in the best possible condition and the actual production of small quantities of material each year, such production being designed not only to maintain the equipment in working order but also to afford the owners of the plants in question at least a small return on the money invested in the housing buildings and the time and attention given to the subject. The provision of the bill is as follows:

For the procurement of such gages, dies, jigs, tools, fixtures and other special aids and appliances, including such plans, specifications and detailed drawings as may be necessary for the immediate manufacture of arms, ammunition and other material necessary for the defense of the country, and for plans for and the installation of such material in private plants in the United States under such contract and agreement as may be made by the Secretary of War, \$1,000,000; provided, that not exceeding 25 per centum of said sum may be used in obtaining from plants so equipped such war material as may be desired; provided further, that not exceeding \$50,000 worth of such material may be purchased from any one person or company, and in making such expenditures the laws prescribing competition in the procurement of supplies by purchase shall not govern.

According to the tentative plans of the War Department the greater part of this appropriation will probably be devoted to providing the necessary gages, dies, automatics, etc., for the production of field artillery and ammunition. A complete set of these appliances will cost several hundred thousand dollars and their manufacture will consume many months under ordinary conditions. It is evident, therefore, that but a very few plants can be fitted up for this purpose. The bill contemplates that about \$50,000 worth of output from each of the plants so equipped will be purchased annually.

THE GOVERNMENT TO BUY LARGELY

Among provisions in the bill governing the purchase of the general material appropriated for are the following:

That except as expressly otherwise authorized herein no part of the sums appropriated by this act shall be expended in the purchase from private manufacturers of any material at a price in excess of 25 per centum more than the cost of manufacturing such material by the Government, or, where such material is not or has not been manufactured by the

Government, at a price in excess of 25 per centum more than the estimated cost of manufacture by the Government.

That expenditures for carrying out the provisions of this act shall not be made in such manner as to prevent the operation of the Government arsenals at their most economical rate of production, except when a special exigency requires the operation of an arsenal's equipment at a different rate.

The appropriations carried by the bill, which include only the construction, armament and maintenance of fortifications and other works of defense and the procurement of field artillery, and do not include any part of the small arms equipment of the army, aggregate \$21,997,050; but in addition contracts are authorized amounting to \$12,300,000. How much of these sums will be available for the actual purchase of material cannot be stated in view of the discretion vested in the Secretary of War either to manufacture or buy the different classes of material covered by the bill. Because of the general provisions of the measure, however, and of the largely increased appropriations carried thereby, it may be assumed that the Government will be in the market for a great deal more material during the year beginning July 1 next than heretofore. Subject only to the limitations above quoted, the department, if the bill becomes a law in its present form, will be able to develop General Crozier's policy of increasing the expansibility of the arsenals to meet emergencies, while at the same time purchasing very considerable quantities of material from private manufacturers with a view to inducing them to maintain their plants in a high state of efficiency even after the present European demand has ceased.

EXPERTS ALL FOR PRIVATE MANUFACTURE

In reporting the fortifications appropriation bill to the House the committee has removed the injunction of secrecy from the hearings which preceded the formulation of the bill. Embraced in these hearings is a most significant report unanimously adopted by the chief of staff, the assistant chief of staff, the president of the army war college, the chief of engineers, the chief of ordnance, the quartermaster general, the chief signal officer, the surgeon general and the chief of coast artillery, recommending a policy designed to secure the co-operation of private establishments for the manufacture of war material. In summarizing the findings of the board this report says:

The board is of the opinion that the Government should produce in its own plants, especially if it already has them, a proportion of the exclusively military material of all classes of which it has need; this for the purpose of establishing standards, of understanding costs of production, of insuring that attention shall be given to improvement, and of qualifying its officers in all respects as experts with respect to the material needed. It is considered that Government manufacture should be carried on to the extent necessary to insure production in economical quantities, and to enable the Government to exercise a certain control over prices, both by its knowledge of costs and by its ability to manufacture itself instead of accepting exorbitant proposals, in particular cases.

But the overwhelming reason for the utilization of private establishments is the utter inadequacy of the Government-owned plants for meeting its necessities in time of war, and the improbability of their expansion to the point of sufficient capacity. One of the most forcible illustrations of the enormous capacity which is required for the production of the material necessary in the prosecution of a great war is found in the supply of field-artillery ammunition for the present war in Europe. It is reported, with a fair degree of credibility, that one of the 12 governments engaged in that war has found it necessary to assume control over more than 1000 establishments for the production of munitions, in addition to the establishment of over 30 new governmentally operated plants. The number of employees engaged in munitions

tions manufacture in these plants is stated to be over 200 times the total number of employees in the arsenals of the Ordnance Department of the United States Army, and the intention has been authoritatively declared to be to produce more than one hundred times the output of the Ordnance Department's one factory when worked at its full capacity. These statements are conservative.

The European war has brought into existence in this country several war material factories of large capacity. Some of these factories can probably be kept in existence if not in the actual production of munitions at least in the possibility of quick reconversion thereto after the close of the European war. . . . The energy of the people has already been expended in the erection of these plants. It would be uneconomical to expand it over again unnecessarily, in whatever manner and through whatever agency, either public or private, the expenditure might be made. The private munitions plant, capable also of doing commercial work, may be likened to the citizen-soldier, in that it has been made ready for war's usage, but in peace-time earns its own living. The Government arsenal is like the regular. It works only for warlike purposes and has to be maintained.

For the reasons stated above, the board is unanimously and emphatically of the opinion that the Government ought not to establish a monopoly in the production of any of its war material, and ought not to manufacture its own war material to the exclusion of patronage of private manufacturers capable of aiding it.

SECRETARY GARRISON'S STRONG STAND

This report was presented to the Committee on Appropriations by Mr. Garrison, then Secretary of War, and the opinions expressed therein were reiterated by him with great emphasis. With regard to the suggestion so frequently reflected in the current criticism of the policy of preparedness that the Government should make all its own war material in order to deprive private manufacturers of any incentive to arouse war sentiment, Mr. Garrison spoke with much warmth. He said in part:

I simply cannot contemplate the sense of doing that thing. It would involve turning the Government into an enormous manufacturing establishment; buying the plants and equipping them and educating the men; reaching some point, of course, where you would cease present manufacture because you would by such an enlarged plant have sufficient for your then prospective needs, leaving all that enormous investment absolutely idle; then dismissing your men, because it is inconceivable that anybody would suggest retaining them in idleness, to await the eventuality of war to again reopen these plants. The only reason for doing that is the feeling that is averse to the buying from private manufacturers of these identical materials. . . . It is difficult for me to predicate a conclusion upon this matter upon the assumption that there are people who would actually seek to plunge their country into war because they manufacture war material and could thereby make money.

In view of the acceptance by the Appropriations Committee of the War Department's point of view concerning the manufacture of munitions under the fortifications bill, interest will now center upon the terms of the army appropriation bill which is now being framed by the Military Committee before which both Secretary Garrison and General Crozier made substantially the same arguments that were submitted to the Appropriations Committee. W. L. C.

Ferromanganese Imports in Third Quarter of 1915

Imports of ferromanganese into the United States for the third quarter of 1915, ended Sept. 30, 1915, according to official data just issued, were 20,421 gross tons valued at \$1,223,653. This agrees very closely with preliminary data, 20,396 tons imported for that quarter, furnished THE IRON AGE and published Jan. 27, 1916.

The No. 1 furnace of the Pennsylvania Steel Company's Lebanon plant, recently acquired by the Bethlehem Steel Company, was blown in April 8 on spiegel-eisen. H. B. Dutton is superintendent. The stack is of 150 tons daily capacity, and had been idle since January, 1915.

Negotiations are pending for establishing a large steel plant at Sagunto, Spain, according to L'Usine, of Paris.

RAIL PRODUCTION IN 1915

United States Production of All Kinds of Rails in 1915 Increased 259,108 Tons Over 1914

Special Statistical Bulletin No. 2 (1916), of the American Iron and Steel Institute, 61 Broadway, New York, gives statistics of the production of rails in the United States in 1915. Tables are included presenting details for not only 1915, but for a long series of years preceding. The total production of all kinds of rails was 2,204,203 gross tons, against 1,945,095 tons in 1914. The quantities made by the various processes were as follows: Open-hearth, 1,775,168 tons; Bessemer, 326,952 tons; rerolled from old rails, 102,083 tons. No rails were made by the electric process. In 1914 the quantity of rails made of electric steel was 178 gross tons and in 1913 the quantity was 2436 tons. The mills in this country have made no iron rails since 1911.

The maximum output of rails in this country was reached in 1906, when the mills rolled 3,977,887 tons, or 1,773,684 tons more than in 1915. Details of the production since 1910 are as follows:

Production of Rails by Processes—Gross Tons

Years	Open-hearth	Bessemer	Rerolled	Electric	Iron	Total
1910..	1,751,359	1,884,442	230	3,636,031
1911..	1,676,923	1,053,420	91,751	462	234	2,822,790
1912..	2,105,144	1,099,926	119,390	3,455	..	3,327,915
1913..	2,527,710	817,591	155,043	2,436	..	3,502,780
1914..	1,525,851	323,897	95,169	178	..	1,945,095
1915..	1,775,168	326,952	102,083	2,204,203

*Not separately stated.

Girder and high T rails for electric and street railroads are included in the figures given above. For recent years the quantities thus included were as follows: 1912, 174,004 tons; 1913, 195,659 tons; 1914, 136,889 tons; 1915, 133,965 tons.

The number of mills rolling rails in 1915 was 22, of which 14 made open-hearth, 9 made Bessemer and 9 made rerolled rails.

The total production of rails as given above includes, in addition to new rails rolled during the year, rails rerolled from defective rails and from old rails. The total of renewed or rerolled rails so included is given in gross tons in the following table for 1911 to 1915:

Renewed and Rerolled Rails, 1911 to 1915
Rerolled from New Seconds,
New Defective Rails, etc.

Years	Open-hearth	Bessemer	Total	Rolled from Old Rails	Total Rerolled
1911.....	2,631	19,379	22,010	91,751	113,761
1912.....	13,140	29,446	42,586	119,390	161,976
1913.....	12,052	30,741	42,793	155,043	197,836
1914.....	13,538	13,234	26,772	95,169	121,941
1915.....	6,477	2,652	9,129	102,083	111,212

The production of rails by weight per yard from 1910 is given in the following table:

Production by Weight per Yard

Years	Under 45 Lb.	45 and Less than 85	85 and Less than 100	100 and Over	Total, Gross Tons
1910.....	260,709	1,275,339	2,099,983	..	3,636,031
1911.....	218,758	1,067,696	1,536,336	..	2,822,790
1912.....	248,672	1,118,592	1,960,651	..	3,327,915
1913.....	*270,405	†967,313	2,265,062	..	3,502,780
1914.....	*238,423	†309,865	868,104	528,703	1,945,095
1915.....	*254,101	†518,291	742,816	688,995	2,204,203

*Includes rails under 50 lb. †Includes 50 lb. and less than 85 lb.

Included in the above figures is the annual production of alloy-treated rails, shown separately in the following tables. The statistics of rails so treated were first collected in 1909.

Alloy-Treated Steel Rails

Years	Total Production, Gross Tons	Production by Alloys		Production by Weight per Yard			
		Titanium	Other Alloys	Under 45 Lb.	45 and Under 85	85 and Under 100	100 and Over
1909..	49,395	35,945	13,450	..	9,132	..	40,263
1910..	257,324	256,759	565	..	70,170	..	187,154
1911..	153,989	152,990	999	..	27,097	..	126,892
1912..	149,267	141,773	7,494	21	5,426	..	143,820
1913..	69,519	47,858	11,664	*91	†9,414	..	50,014
1914..	27,987	23,321	4,666	*14	†1,168	8,201	18,454
1915..	24,970	21,191	3,779	*6	†1,977	6,555	16,432

*Includes rails under 50 lb. †Includes 50 lb. and less than 85 lb.

Division of Alloy-Treated Steel Rails, 1915

	Total Production	Production by Weight per Yard			
		Under 50 Lb.	50 to 84	85 to 99	100 and Over
Alloys	21,191	6	1,823	6,186	13,176
Titanium	3,779	..	154	369	3,256
Manganese	24,970	6	1,977	6,555	16,432

Of the total production of rails in 1915, Pennsylvania mills rolled 694,545 tons, or 31½ per cent, against 30½ per cent in 1914.

Government Armor Factory Bill Progresses

WASHINGTON, D. C., April 12, 1916.—The House Committee on Naval Affairs, April 5, by a vote of 15 to 6, ordered a favorable report on the Tillman bill appropriating \$11,000,000 for the purchase or construction of a Government armor factory. The report of the committee filed by Chairman Padgett embodies a brief review of the history of the armor plants of the Bethlehem, Carnegie and Midvale steel companies and the controversy concerning the price of armor plate. In conclusion the report says:

While it is admitted that armor plate is not an article of commercial use and that the Government is the only customer for armor plate in the United States, yet it is the opinion of the committee that the Government should not be compelled to pay a price set by domestic manufacturers where it has been demonstrated that competition no longer exists. It is therefore believed that as a measure of protection against such a condition of affairs the committee should recommend the erection or the purchase of a factory for the manufacture of armor plate for the vessels of the United States Navy, and therefore recommends that the bill do pass.

An effort will be made to secure consideration for the bill before the naval appropriation bill is reported. Chairman Padgett predicts its passage by a large majority. It will have strong opposition, but in view of the extent to which the Administration's influence is being exerted in its favor the chances now point to its enactment.

W. L. C.

Again the Steel Corporation's Largest Order Book

Again the largest unfilled tonnage at the close of any previous month in the history of the U. S. Steel Corporation was shown by the monthly report revealing a tonnage of 9,331,001 tons on the books March 31, 1916. This is an increase of 762,035 tons over the unfilled orders at the close of February, 8,568,966 tons, which was then the record month. The unfilled tonnage a year ago, March 31, 1915, was 4,255,749 tons, the present report being more than double that. The following table shows the unfilled tonnage for each month, beginning Dec. 31, 1912:

March 31, 1916.....	9,331,001	July 31, 1914.....	4,158,589
Feb. 29, 1916.....	8,568,966	June 30, 1914.....	4,032,857
Jan. 31, 1916.....	7,922,767	May 31, 1914.....	3,998,160
Dec. 31, 1915.....	7,806,220	April 30, 1914.....	4,277,068
Nov. 30, 1915.....	7,189,489	March 31, 1914.....	4,653,825
Oct. 31, 1915.....	6,165,452	Feb. 28, 1914.....	5,026,440
Sept. 30, 1915.....	5,317,618	Jan. 31, 1914.....	4,613,680
Aug. 31, 1915.....	4,908,455	Dec. 31, 1913.....	4,282,108
July 31, 1915.....	4,928,540	Nov. 30, 1913.....	4,396,347
June 30, 1915.....	4,678,196	Oct. 31, 1913.....	4,513,767
May 31, 1915.....	4,264,598	Sept. 30, 1913.....	5,003,785
April 30, 1915.....	4,162,244	Aug. 31, 1913.....	5,228,468
March 31, 1915.....	4,255,749	July 31, 1913.....	5,399,356
Feb. 28, 1915.....	4,345,374	June 30, 1913.....	5,807,317
Jan. 31, 1915.....	4,248,571	May 31, 1913.....	6,324,322
Dec. 31, 1914.....	3,836,643	April 30, 1913.....	6,978,762
Nov. 30, 1914.....	3,324,592	March 31, 1913.....	7,468,956
Oct. 31, 1914.....	3,461,097	Feb. 28, 1913.....	7,656,714
Sept. 30, 1914.....	3,757,667	Jan. 31, 1913.....	7,827,368
Aug. 31, 1914.....	4,213,331	Dec. 31, 1912.....	7,982,164

The purchasing department of the Cambria Steel Company has been removed from the Oliver Building, Pittsburgh, to the Widener Building, Philadelphia. The sales department of this company is now in the Widener Building, having been removed from the Morris Building, and it is expected that the treasury and auditing departments will soon follow to the new quarters.

The Anderson Foundry & Machine Company, Anderson, Ind., has taken a large order for the new tin-plate mill of the Bethlehem Steel Company at Baltimore, Md.

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Carbon in Cast Iron at Different Temperatures

Discussing "Carbon in Cast Iron" at a recent meeting of the Ipswich (England) Engineering Society, E. Adamson of Sheffield said that cast iron was perhaps the most crude of the metals. It had been assumed that everything was constant, and that it could be produced in the ordinary way without any difference in its composition and qualities. Prior to 1886 foundrymen had no scientific instrument to get sufficient accuracy, nor did they understand so much about the practical side of metallurgy as at present. In the light of that old knowledge it was thought that the addition of silicon softened iron, and that by varying the silicon there were corresponding variations in the strength of cast iron. But it was not realized that other things, including carbon, had to be considered.

For many years it was commonly understood that the highest amount of carbon that could be taken up by pure iron was 4.50 per cent. At 1100 deg. C. that figure was correct, but on raising the temperature to 2200 deg. it was found that 9.50 per cent of carbon could be absorbed. Iron containing 4.50 per cent of carbon when cooled down under normal conditions made white iron; but with the higher percentage it was impossible to secure a white iron, because a certain amount of graphite separated out and consequently made it grey or mottled. The reason had yet to be discovered, but men with a good deal of blast-furnace experience believed that the character of the carbon formed at the higher temperature was such that it would not become combined carbon under any conditions. Above a temperature of 2200 deg. the iron would not contain so much as 9.50 per cent of carbon, because a certain amount of the carbon was really burned out. The most important points were the time during which the iron was left in contact with the hot coke in a foundry cupola and also the temperature of melting, as this latter decided the total amount of carbon taken up and accounted for the differences between modern irons and those of the cold-blast manufacture.

On remelting pig or cast iron, it was shown, the primary condition of the carbon is important in influencing the grade and strength of the material produced. The quicker the cooling, the more closely compacted the form of the carbon, and therefore the greater the strength and durability of the metal. Analysis alone would give only a rough-and-ready guide as to what the cast iron would be, but the fracture showed whether the casting would be close or open. The lower the total carbon in the iron, the better the chance of keeping the free carbon in a small condition and thus getting a solid casting. The addition of sulphur increases the depth of chill, and if the castings are thin it requires care to keep from chilling the casting right through.

Effect of Temperature on the Determination of Carbon by Combustion

The influence of temperature on the results obtained by the direct combustion of steel and iron in oxygen has been frequently investigated, and the consensus of opinion seems to be that higher results for carbon are obtained with higher combustion temperatures. This conclusion is discussed by J. R. Cain, associate chemist, and H. E. Cleaves, assistant chemist of the U. S. Bureau of Standards, in Technological Paper No. 69, "Determination of Carbon in Steels and Irons by Direct Combustion in Oxygen at High Temperatures." The results given in a table show that some steels give higher results by the new method of the authors than are shown on the certificates, others only slightly higher figures, and still others give the same results by both methods.

"Abstracts of Current Decisions on Mines and Mining," reported from May to September, 1915, is the title of Bulletin 113 of the United States Bureau of Mines. There has been a wide demand for such information and this is the fifth of its kind issued by the bureau.

Pure Iron-Carbon Alloys for Research

The preparation of pure iron and iron-carbon alloys is the subject of Scientific Paper No. 266, issued by the U. S. Bureau of Standards, and written by J. R. Cain, E. Schramm and H. E. Cleaves. It is shown that previous work on the iron-carbon diagram is unsatisfactory because of the great uncertainty of the chemical composition of the materials used. The necessity for the production of a series of alloys of great purity was therefore considered necessary to form the basis of a redetermination of the diagram at the Bureau of Standards. The general method pursued consisted in melting electrolytic iron with sugar carbon in magnesia crucibles. The electrolytic iron was prepared from ingot iron anodes in a chloride bath with or without the use of porous cups. Operating difficulties were overcome by melting in a vacuum furnace using especially pure magnesia, made and calcined with great care. A series of alloys was prepared of the composition $\text{Fe} \pm \text{C} = 99.96$ per cent.

Ductile and Non-Corrosive Chromium Alloys

Non-oxidizing chromium alloys, that are ductile and malleable, with a high electrical resistance and a low temperature coefficient, are the subject of a patent (U. S. 1,175,724—March 14, 1916) issued to Wilbur B. Driver, East Orange, N. J. It is based on the discovery that, whereas a substantial percentage, 5 to 10 per cent, of chromium added to copper alone gives such inferior mechanical qualities that the material is practically valueless, yet when the chromium is to be added to a mixture or alloy of copper and some other metal such as manganese or nickel, the chromium may be added in quantities from about 10 to 20 per cent, and will produce a ductile and malleable alloy and one with relatively high resistance to oxidation. The patentee prefers an alloy of 10 per cent chromium, 45 per cent nickel and 45 per cent copper by weight. The lowest temperature coefficients, he says, have been obtained when the nickel and copper are used in about equal amounts.

British and American Tin-Plate Exports

British tin-plate exports to neutral countries in 1915 were 88,963 gross tons, as compared with 99,715 tons in 1913. They were distributed as follows:

	1913, Gross Tons	1915, Gross Tons
Denmark	5,312	5,929
Sweden	7,660	5,274
Holland	43,009	27,908
Norway	25,166	38,510
Roumania	10,927	1,181
Switzerland	7,641	10,161
	99,715	88,963

Norway and Switzerland considerably increased the quantities taken in 1915. As to Holland, it is not known what proportion of the 43,000 tons in 1913 was consumed in that country and what went to Germany.

Total tin-plate exports from Great Britain in 1915 were 368,602 tons, and in 1913 they were 494,497 tons. From the United States the exports in 1915 were 154,541 tons; in 1913 only 57,812 tons.

Hard Lead Alloys Without Antimony

Hard alloys of lead and alkaline earth metals, such as calcium, magnesium, strontium or barium, are described in a series of patents (U. S. 1, 158, 671-2-3-4-5) granted to F. C. Frary and S. N. Temple, of St. Paul, Minn. The claim is that these alloys of lead with calcium, etc., excel antimonial lead in hardness and toughness and can be used as type metal or wherever an alloy is desired for molding purposes. The metals added to the lead are in such small quantities compared with the necessary antimony that the new alloys are less expensive, especially when antimony is high.

The Falls Clutch & Machinery Company, Boston, Mass., has been incorporated, with capital stock of \$10,000. Delcevaré King is president and Theophilus King is treasurer.

TO REPORT TAVENNER BILL

Status of Movement to Kill Scientific Management in Government Shops

WASHINGTON, D. C., April 11, 1916.—The House Committee on Labor at a meeting to be held on Thursday, April 13, will undertake to finally dispose of the Tavenner bill prohibiting scientific shop management in Government establishments. The parliamentary status of the measure is peculiar and there is much curiosity among those interested as to how the committee will undertake to meet the situation.

HOW THE BILL WILL BE REPORTED

The Tavenner bill on March 23 was ordered to be reported favorably to the House without the formality of a hearing to those who might be expected to oppose the measure or without official notice of any kind that action upon it was contemplated. Investigation subsequently developed the interesting fact that the committee in executive session had given hearings to Representative Tavenner and to N. P. Alifas, president of the machinists' union, representing the Washington navy yard and other Government establishments. James A. Emery, general counsel for the National Association of Manufacturers, thereupon made a formal demand on the committee for a hearing, which was accorded, although the notice given was so short that only a few of the many engineers and manufacturers who would gladly have come to Washington to oppose the bill were able to be present.

The champions of the bill now claim that the order of the committee reporting the bill favorably still stands and that the measure automatically goes to the House without further action. Mr. Emery insists, however, that the action of the committee according a hearing reopens the whole case and that to preserve good faith some member of the committee must move to reconsider the vote by which the bill was reported; otherwise, he contends, the committee will put itself in the position of having agreed to hear evidence after the jury had irrevocably reached its decision. It is the best opinion here that a formal motion to reconsider will be made on Thursday, but that it will be voted down, after which the bill will be sent to the House with a favorable report, which will probably be prepared by Representative Keating, who presided at the recent hearings.

FUNDS OF COMMITTEE OF TEN

After the close of the report of the hearings, as published in THE IRON AGE of April 6, the Committee on Labor gave a hearing to W. B. Richards, of Gunn, Richards & Co., consulting engineers, New York, who has served as treasurer of the Committee of Ten appointed largely from among the engineering societies, to enable him to answer the charge preferred by Mr. Tavenner that money was "being used" to defeat the pending bill. At the request of the committee, Mr. Richards described the meeting of engineers and others presided over by W. W. Macon, of THE IRON AGE, at which the general scope of the movement against the Tavenner bill was decided upon, and told of the sending out of 500 letters soliciting funds to carry on the work, which he said had brought in the sum of \$335.

Representative Tavenner declared he was satisfied that in raising the money referred to neither Mr. Richards nor the Committee of Ten did anything objectionable. "In the last Congress," he added, "there was an investigation into the business methods of the National Association of Manufacturers, and Mr. Emery of that association seemed to be in charge of the opposition to the bill, and I thought that the revelations coming before that committee justified me in keeping track of what that same association was doing in connection with this bill. When I read a letter stating that money was being raised to defeat this bill, I thought I was justified in giving the facts to it. I want to say, in fairness to Mr. Richards, that I do not think that he has done anything in the least objectionable, and I thought

it right that the hearings should contain a statement to this effect."

In view of the criticism by Mr. Tavenner and others of the work of the Committee of Ten, Mr. Richards filed with the committee a brief formal statement concerning the attitude of himself and his colleagues and the steps taken by them to arouse public opinion against the bill. The statement practically in full was as follows:

I think it may be safely said that in the opinion of the engineering profession and the manufacturing world, the Tavenner bill could be properly entitled "A bill to penalize efficiency in the public service." It undertakes to make a criminal of every officer of the United States who uses in a public establishment those methods which in thousands of private plants and in the arsenals controlled by the War Department have demonstrated over a period of years their unquestioned capacity at once to decrease the cost of production and increase the wages of employees. As Thomas A. Edison, the dean of American inventors, says of the measure, "It is an attempt to prevent efficiency and would be disastrous to labor and the public."

It is to call the attention of Congress and the public to this vicious proposal to condemn efficiency and penalize progress that a Committee of Ten was spontaneously organized in the engineering profession to spread information of the nature and consequences of this measure among the public and our legislators. To that end our committee has made a public appeal for funds to prepare and distribute educational literature and permit the presentation of our judgment and evidence to the committees and members of Congress that they may not be unduly misled as to the meaning of this effort to make criminals of public officers who endeavor to better the public service.

German Steel Costs in the Open-Hearth Process

A German metallurgist, W. S. Schömburg, writing in *Feuerungstechnik*, says that a comparison of results obtained at Witkowitz, Hoesch and other works shows that the hot-metal process not only gives a considerable saving in fuel consumption per ton of steel, but also in life of the furnaces, reduced consumption of ferromanganese, recovery of marketable phosphoric slag and quicker working of the charge. None of the various open-hearth processes examined, however, is considered to afford the best solution of the problem of steelmaking, all being insufficiently adaptable to sudden market changes, since the use of a high proportion of scrap retards the working of the charge to an excessive degree.

Although it is really impracticable to establish a comparison between the relative costs of production by the hot-metal and scrap processes, the author has attempted to do this from the data furnished by a month's working at a steel works producing 7000 tons per month. The materials of the charge cost \$16.14 per ton of steel; fuel, \$1.10; additions (ore, limestone, aluminum), 16c.; furnace lining, 67c.; ingot molds, 19c.; labor, 80c.; repairs, 17c.; electric power, pumping, etc., 24c.; stores, 65c.; spare parts, etc., 20c.; sundries and depreciation, 29c.; total, \$20.64, less 28c. for slag, etc., and 35c. for casting scrap, etc.; or net, \$20.01 per ton of steel. Since \$15.78 of this represents cost of charging material, the conversion costs \$4.23 per ton of sound ingots. In a second steel works (scrap process) the cost of fuel was only 77c., as compared with 92c. at the Dortmund Union Works and 87c. at Witkowitz.

With regard to the relative cost of furnace linings for the scrap and ore processes respectively, this is given at 51c. to 67c. for the former (the lower figure being for a 45-ton furnace running 480 to 550 charges between renewals), and 34c. to 35c. for the ore process (a 200-ton Talbot furnace running 800 to 900 charges and a 60-ton Wellman tilting furnace running up to 1500 charges), but the comparison is regarded as of doubtful value.

The author's conclusion is that working the two processes is the most economical plan, since it is thus possible to take full advantage of market fluctuations.

MORE NEW ENGLAND STRIKES

Machinists' Union Makes Closed Shop Demand at Bridgeport and Elsewhere

Now that spring has arrived, the long threatened strikes of machinists in several New England cities are beginning to take definite form and the efforts of the organizers are becoming much more aggressive. In the last two weeks, in Bridgeport, Conn., the local machinists' union has presented demands upon several concerns for recognition of the closed shop. To a large extent, these demands have been presented to small manufacturers doing contract work for the larger concerns, principally for the Remington Arms-Union Metallic Cartridge Company. It is reported that demands were presented to eighteen manufacturers. The Bridgeport Manufacturers' Association took a page in each of the Bridgeport local papers one day last week for the display of an advertisement, setting forth the text of an agreement various manufacturers had been asked by the machinists' union to sign. It is the usual form of closed shop contract. The main provisions are for a 48-hr. week, time and a half for overtime, double time for Sundays and holidays, a minimum of 60c. per hour for toolmakers and 50c. for machinists, one apprentice for five journeymen, adjustment of grievances by the company with a shop committee or with a business agent in case the committee and company do not agree, and a notice of 30 days for the termination of the agreement. After quoting the form of agreement the Bridgeport Manufacturers' Association pledges its members to the maintenance of the open shop, "believing it to be for the best interest of both employees and employers that no discrimination be made in the employment of labor."

The immediate effect of the publication of this advertisement was to defer action for some time, and it is reported that a strike may not come until after May 1.

Agitation is once more the order of the day in Worcester, Mass., and it is believed that between now and June 1 an effort will be made to call strikes in quite a number of the shops which were not affected last fall. The Boston district has had a number of small strikes and one or two are now in progress. There seems little doubt that Boston manufacturers will receive the demand the machinists' union is presenting in the other cities and that a period of labor trouble will ensue. In general it looks as if the next few weeks will see even more labor disturbance in the cities in which organization has been carried on so actively during the past ten weeks. The agitation is being extended to the smaller manufacturing towns, so that the labor outlook in New England, as a whole, is not very bright at this time.

As a result of the strike, the plant of the Hendey Machine Company, Torrington, Conn., has been closed down. Both sides seem firm in their determination not to yield. Two hundred employees of the Millers Falls Tool Company, Millers Falls, Mass., went on strike April 7, for a 15 per cent increase in wages. Conferences have so far failed to bring about a settlement.

To add to the tension, the munition companies are becoming much more active in all the industrial centers in their effort to secure high grade workmen, and the manufacturers are being forced to pay their skilled employees high wages in order to retain them. It would be conservative to say that New England munitions plants are needing 12,000 more machinists at this time, and as the pressure to fulfill contracts increases it is probable that the labor market of New England will be much more disturbed than it has been during the past year.

The Central Steel Company, Massillon, Ohio, is going ahead with its plans to add a new bar mill to its plant, and in addition will install a gas-producer equipment for its open-hearth furnaces. An expenditure of about \$700,000 will be made for the extensions. For this purpose \$300,000 in additional preferred stock will be issued and the remainder of the expense will be met with earnings.

Federal Aid for Vocational Education

WASHINGTON, D. C., April 10.—The Chamber of Commerce of the United States has sent out a referendum to its membership on the question of Federal aid for vocational education. A report of a special committee, of which Frederick A. Geier, president Cincinnati Milling Machine Company, is chairman, recommends:

Liberal Federal appropriations for promotion of vocational education in the United States;

That Federal appropriations should be allotted among the states upon a uniform basis and should bear a uniform relation to appropriations made by the states for like purposes;

The creation of a Federal board, to be representative of the interests vitally concerned and to be compensated sufficiently to command great ability;

That the Federal board should be required to appoint advisory committees of five members each, representing industry, commerce, labor, agriculture, homemaking, and general or vocational education.

It is the opinion of the committee that the Federal Government should at once extend its aid to the states for training in trade and industrial subjects just as it has with great success and national benefit for many years assisted the States in agricultural instruction; The Federal Commission on National Aid to Vocational Education, appointed by the President in 1914, reported that only eight states had established systems for vocational education, and that these systems have not yet reached 1 per cent of the workers who need industrial training.

No suggestion is made by the committee that the Federal Government should do more than extend its financial assistance and the encouragement which will flow from its appropriations and its example. The administration of the schools would remain wholly in the hands of local authorities and the instructors would be municipal or state employees, and not Federal employees.

More Heroult Furnace Installations

Licenses for the operation of three more Heroult electric steel furnaces have been granted by the United States Steel Corporation. They are as follows:

The Carpenter Steel Company, Reading, Pa., is installing one 6-ton furnace to make tool and special steels.

The Hussey-Binns Steel Company, Charleroi, Pa., will install one 6-ton furnace to replace crucible steel. The company makes ingots for shovels and also special steels.

The Llewellyn Iron Works, Los Angeles, Cal., will install a 3-ton furnace for making steel castings.

Besides these licenses the Firth-Sterling Steel Company, McKeesport, Pa., has built and started a second 3-ton Heroult furnace for making special and tool steels.

These four furnaces make a total of 62 Heroult furnaces installed or contracted for in the United States and Canada, 59 of which have been made public.

Pennsylvania Railroad 70 Years Old

The Pennsylvania Railroad Company has issued as its Bulletin No. 10 a poster for the public bearing the heading "Seventy Years a Railroad." The statement is made that the Pennsylvania Railroad is seventy years old this month, its charter having been granted April 13, 1846. It is stated further that for what the railroad represents after these seventy years credit belongs, first, to the stockholders, whose capital made possible its development; second, to those directors, officers and employees "who have gone before, and to the 250,000 of us who are now working to make this railroad system better every day"; third, to a helpful and reasonable public. The poster concludes with, "Above all, we know that the future prosperity of our company depends upon the continued confidence, co-operation and good will of the people it serves."

Japanese manufacturers have many agents through Central America seeking to sell their goods, according to the president of a New York company, dealing in that territory, who has recently returned from that section.

May Meeting, Iron and Steel Institute

Below is given a tentative list of papers prepared for the New York meeting of the American Iron and Steel Institute, to be held at the Waldorf-Astoria, May 26 and 27:

By-Products Recovered in the Manufacture of Coke. By W. H. Childs, president Barrett Company.

Discussion by W. H. Blauvelt, Semet-Solvay Company, Syracuse, N. Y.

The Electric Furnace in Steel Manufacture. By Dr. John A. Mathews, president Halcumb Steel Company, Syracuse, N. Y.

Discussion: R. F. Flinterman, Michigan Steel Casting Company (Heroult); L. E. Howard, Simonds Mfg. Company (Girod and Heroult); Robert M. Keeney, Snyder Electric Furnace Company (Snyder); W. G. Kranz, National Malleable Castings Company (Heroult).

Rail Manufacture. By Dr. John S. Unger.

Discussion: H. C. Rydine, assistant to vice-president Tennessee Coal, Iron and Railroad Company, and by a representative of the Bethlehem Steel Company.

The Distribution of Materials in the Blast Furnace. By Geo. W. Vreeland, superintendent blast furnaces of Carnegie Steel Company, Mingo Junction, Ohio.

Discussion: Duquesne, Neeland top, A. N. Diehl; Youngstown, McDonald top, J. C. Barrett; Central and Lorain, McKee top, A. J. Boynton; Cambria, Slick top, R. C. Glazier; South Chicago, plain double bell, H. A. Brassert, Ensley, brown top, K. Landgrebe.

Evening Session

The Hell Gate Bridge. By Jacob Loewenstein, engineer American Bridge Company, New York.

Italy's Iron and Steel Output

Italy's pig-iron production in 1914, according to belated official statistics recently given out, was 385,340 metric tons, and the imports were 219,995 tons, making a total for consumption of 605,334 tons. These figures compare with an output of 426,755 tons in 1913, imports of 236,931 tons, and a total for consumption of 663,686 tons. Thus more than half as much is imported as is produced. Of the 1914 output 378,912 tons was coke iron and 2318 tons electric furnace pig iron.

In 1914 the iron-ore production was 706,246 metric tons, the largest in the past ten years, that for 1913 being 603,116 tons. Italy is practically self-supporting in iron ore.

The output of manufactured iron and steel in 1914 was 950,889 tons, as compared with 1,033,968 tons in 1913. Steel bars, plates, shapes, rails and other manufactured steel made up 796,152 tons of the total, against 846,085 tons in 1913. Italy made 26,284 tons of tin plates in 1914 and 29,185 tons in 1913.

The output of steel ingots in 1914 was 911,000 tons, against 933,500 tons in 1913. The scrap consumed is given as 301,650 tons of domestic and 208,910 tons of imported. Ferroalloys used were 22,740 tons. The wrought-iron output was 114,322 tons, against 142,820 tons in 1913.

Recent orders taken by Heinrich J. Freyn, Peoples Gas Building, Chicago, include a plant license issued to the Indiana Steel Company for the universal burners for the 14 new stoves to be built at Gary; six 10-in. universal stove burners and 36 10-in. Birkholts-Terbeck boiler burners for the Republic Iron & Steel Company; four 10-in. boiler burners for the Lackawanna Steel Company and nine additional for the Lackawanna Iron & Steel Company. The Ford Motor Company has also ordered 12 additional burners for boilers burning natural gas at its Canadian plant.

A two weeks summer session in factory organization, cost accounting and scientific management is to be held at Pennsylvania State College, State College, Pa., beginning Aug. 7. The course will be given by Prof. Hugo Diemer, professor of industrial engineering. A fee of \$15 will be charged and a certificate given to those completing the course. A circular has been issued outlining the work.

Foundry Equipment in Relation to Labor Costs

With a paper entitled "Resolved That the Foundry Is a Machine and Not a Building," Henry M. Lane, H. M. Lane Company, Detroit, addressed a joint meeting at St. Louis, April 8, of the St. Louis Foundrymen's Club and the Washington University Section of the American Society of Mechanical Engineers. Extracts from it follow:

When our foundry structure or frame is finished we simply put on a skin to keep out the weather, and then we call it a building. If the climate were suitable no outer covering would be necessary, as the frame for supporting and bracing the crane runway, carrying the charging platform, the shafting, piping, etc., would be there just the same. The parts ordinarily represent more than 60 per cent of the cost of the inclosing building.

When we lay out a plant we must remember that the main part of the cost in making the castings is labor, and most of this labor is put forth in the handling of such materials as iron, fuel, sand, flasks, etc. A few feet of extra walking or an extra operation in connection with any part of the production of the casting will put an additional burden on the foundry as long as it runs, and a few of these additional burdens may mean the difference between profit and loss in the final summing up of the foundry. When we build a foundry we must design the plant so that we will obtain the greatest number of pounds of metal per hours of labor expended.

A detail study of two different methods of production applicable to the production of a given line of castings was made during the past year. The figures showed that a building could be constructed for about \$1.85 per square foot in which the hot metal would be carried on hand trolleys, all of the sand would be cut over on the floor, the cores would be delivered to the molders on the floor, the castings taken out by a night gang utilizing the main gangways, and most of the handling of the castings in the cleaning room would be done by manual labor, with the assistance of a few jib cranes or floor-controlled traveling cranes. In other words, this was a one-story cheaply constructed foundry of the more conventional type.

The other proposition was to make a foundry that would cost about \$2.90 per square foot. In this case the castings were to be made on the second floor, continuous pouring was to be followed, and all the work of a given shift cleaned up in the one shift. In other words, there would be no night gang, though the pouring gang would come on one hour after the molding gang, and the cleaning department would start one hour later and each work their regular shift. In the latter foundry figures showed that the cost of the castings would be almost identical with those made in the cheaper building, but that it would require 40 per cent less labor. In other words, the interest in depreciation on the mechanical appliances introduced would bring the cost of the castings up to a figure equal to that in the first mentioned plant. With the present labor situation, however, everyone will agree that with sufficient funds available the continuous foundry has distinct advantages, and with certain improvements, which it was believed could be made, it was thought that the cost of producing castings in a continuous foundry would ultimately be reduced considerably and give it a distinct advantage over the other.

The Crucible Steel Casting Company, Cleveland, Ohio, has adopted the electric melting process for making steel castings and alloy castings in place of the crucible process. It has just completed the installation of a one-ton Heroult electric furnace which takes the place of its two 10-pot crucible furnaces.

The Deamond-Stephan Mfg. Company, Urbana, Ohio, manufacturer of grinding wheel dressers, has acquired the business of the Rupert Company, Indianapolis, Ind., manufacturer of Huntington grinding wheel dressers.

Iron and Steel Markets

THE NEW BASIS FOR RAILS

A Moderate Advance Above \$30 Is Likely

March Buying of Pig Iron a Record at 1,000,000 Tons for Northern and Virginia Furnaces

There is the same urgent demand upon the mills for the delivery of steel, a good deal of it overdue, but the market is less feverish and new buying is lighter. Manufacturing consumers are covered for some months ahead, and the fear of not being able to get material for their operations in the second half of the year is less a factor.

The large increase shown in the Steel Corporation's unfilled orders points to a continuance of the present strain for a good many months—that in the main is the judgment of the trade, and there is little attempt to appraise the factors in the advance from 8,569,000 tons of orders on Feb. 29 to 9,331,000 tons on March 31. The heavy March rail orders are generally thought of, but it is not known what part of them is included.

A certain amount of possible steel consumption is being cut off by high prices, but apart from smaller buying of wire products the ultimate consumer has scarcely been heard from, and steel manufacturers have been too much driven to give heed to special appeals like that of the implement manufacturers. Negotiations of some of the latter for bars and special shapes for the second half show, however, that they are not disposed to buy more than half to two-thirds their usual amount. Bars have brought as high as 2.35c., Pittsburgh, in some recent transactions of this sort.

Rail sales for 1917 have brought some mills to the point of having disposed of all the rails that can be rolled from the steel apportioned to them for the full first half of 1917, and in one or two cases farther. More steel capacity will be coming along late this year and early next year, and the rail mills will share in its output. Meanwhile developments point, not to fluctuating prices for rails, but to a new stabilized price, beginning with May, ranging \$3 or \$4 a ton above the \$30 level for open-hearth rails.

In the past week sales of 100,000 tons of rails for next year have been made in the Chicago district, including 40,000 tons for the Rock Island and a total of 35,000 tons for the Northern Pacific. The Pennsylvania order is expected to be 175,000 to 200,000 tons.

The French State Railways have bought 4000 cars, of which only 500 will be built in the United States. Canada got the larger part, and some were placed in Spain. Domestic railroads closed in the week for about 4500 cars.

Little is to be said of price changes. Chicago sellers of bars and shapes advanced those products

\$2 a ton, and plates \$3 a ton, but there are no corresponding advances at Pittsburgh.

The structural trade shows the anomaly of bookings in March equal to 102 per cent of the country's fabricating capacity for a month and at the same time aggressive bidding by large fabricators, particularly in the West.

Sheet mills are overrun with business in their galvanized and blue annealed product, while black sheets are only in fair demand, with prices weak in comparison with every other department of the market.

An advance has been made in cut nails to \$2.60 per keg. Wire nails, in spite of their recent scheduling for a further rise, remain at \$2.40.

Pittsburgh producers have shown little interest in recent efforts of foreign buyers to place orders for billets, rounds and forgings. They have simply had to put off considering new business of this character. A Southern steel company has been offering some semi-finished steel for export over and above the requirements of its wire plant. At New York an inquiry has come up for 100,000 tons of 8-in. shell forgings.

March is rated by leaders in the pig-iron market as the month of record transactions in merchant iron, data gathered from Northern and Virginia furnaces indicating over 1,000,000 tons sold. Prices are well held, but the rapid advances producers have predicted await the coming of an urgent demand for spot iron, such as has been seen at no time in the past year's movement.

At Chicago some fresh pig-iron inquiry has developed after the recent lull, and here and there round lots are in demand, but generally the quietness has continued. Furnaces in various districts have made sales, not large ones, for the first half of 1917 at to-day's prices. Southern Iron has sold at both \$15.50 and \$16 for that delivery.

Pittsburgh

PITTSBURGH, PA., April 11, 1916.

The demands on the mills for deliveries of steel are as urgent as ever, but new buying is lighter than for some months. If the material that is now on the books is taken out, and it is likely it will be, most of the mills have orders enough to take practically all the product they can turn out this year. What will be done when the fall months come, in placing new contracts, if prices are as high as they are now, is a question. Some in the trade believe, and this opinion is shared by some of the mills, that a readjustment of prices in the fall to a lower basis would be a good thing. About the only advance in prices noted during the week is in shafting, which is again up \$10 per ton. Some heavy contracts for cold-rolled strip steel are being placed for last half of the year delivery at 6c. per lb. There have been some contracts in blast furnace coke for last half at \$2.90 to \$3, but prompt furnace coke is soft, due to an accumulation. Scrap is also weak with demand dull, and some dealers who recently bought heavy steel scrap at close to \$19 find they have no market for it, even at lower prices.

Pig Iron.—An Eastern consumer is reported to have closed for 10,000 tons of basic for delivery in last half at slightly less than \$18.25, Valley furnace. A sale is

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	April 12, 1916.	April 5, 1916.	Mar. 15, 1916.	April 14, 1915.
No. 2 N., Philadelphia...	\$20.50	\$20.50	\$20.00	\$14.25
No. 2 Valley furnace....	18.50	18.50	18.50	12.75
No. 2 Southern Cin'ti....	17.90	17.90	17.90	12.40
No. 2 Birmingham, Ala.	15.00	15.00	15.00	9.50
No. 2 furnace, Chicago*	19.00	19.00	18.50	13.00
Basic, del'd, eastern Pa...	20.50	21.00	19.50	13.25
Basic, Valley furnace....	18.25	18.25	18.25	12.50
Bessemer, Pittsburgh....	21.95	21.95	21.95	14.55
Malleable Bess., Ch'go*	19.50	19.50	19.50	13.00
Gray forge, Pittsburgh..	18.70	18.70	18.45	13.45
L. S. charcoal, Chicago..	19.75	19.75	19.75	15.75

Billets, etc., Per Gross Ton:	April 12, 1916.	April 5, 1916.	Mar. 15, 1916.	April 14, 1915.
Bess. billets, Pittsburgh.	45.00	45.00	45.00	20.00
O-h. billets, Pittsburgh.	45.00	45.00	45.00	20.00
O-h. sheet bars, P'gh....	45.00	45.00	45.00	21.00
Forging billets, base, P'gh	67.50	67.50	65.00	25.00
O-h. billets, Phila.....	50.00	50.00	50.00	21.52
Wire rods, Pittsburgh....	60.00	60.00	55.00	25.00

Finished Iron and Steel,	Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25	
Iron bars, Philadelphia..	2.650	2.559	2.559	1.15	
Iron bars, Pittsburgh....	2.50	2.50	2.40	1.20	
Iron bars, Chicago.....	2.35	2.35	2.15	1.15	
Steel bars, Pittsburgh...	2.75	2.75	2.75	1.20	
Steel bars, New York...	2.919	2.919	2.919	1.369	
Tank plates, Pittsburgh..	3.75	3.50	3.00	1.15	
Tank plates, New York...	3.919	3.669	3.419	1.319	
Beams, etc., Pittsburgh..	2.50	2.50	2.50	1.20	
Beams, etc., New York...	2.760	2.669	2.619	1.369	
Skelp, grooved steel, P'gh	2.35	2.35	2.20	1.12½	
Skelp, sheared steel, P'gh	2.45	2.45	2.30	1.17½	
Steel hoops, Pittsburgh..	3.00	3.00	2.75	1.25	

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.85	2.85	2.75	1.80	
Galv. sheets, No. 28, P'gh	5.00	5.00	4.75	3.25	
Wire nails, Pittsburgh...	2.40	2.40	2.40	1.55	
Cut nails, Pittsburgh...	2.00	2.30	2.30	1.55	
Fence wire, base, P'gh...	2.25	2.25	2.25	1.40	
Barb wire, galv., P'gh...	3.25	3.25	3.25	2.10	

Old Material, Per Gross Ton:	April 12, 1916.	April 5, 1916.	Mar. 15, 1916.	April 14, 1915.
Iron rails, Chicago....	18.00	18.00	18.00	11.75
Iron rails, Philadelphia..	20.00	20.00	20.00	13.00
Carwheels, Chicago....	14.00	14.00	14.50	9.75
Carwheels, Philadelphia..	17.50	17.50	16.50	11.00
Heavy steel scrap, P'gh...	18.00	18.25	19.00	11.75
Heavy steel scrap, Phila..	18.00	18.00	17.00	11.00
Heavy steel scrap, Ch'go.	16.50	16.50	16.75	9.00
No. 1 cast, Pittsburgh...	16.00	16.25	16.00	12.00
No. 1 cast, Philadelphia	18.00	18.00	17.00	12.00
No. 1 cast, Ch'go (net ton)	13.00	13.00	13.50	9.00

Coke, Connellsville, Per Net Ton at Oven:	April 12, 1916.	April 5, 1916.	Mar. 15, 1916.	April 14, 1915.
Furnace coke, prompt...	\$2.65	\$2.75	\$3.35	\$1.50
Furnace coke, future...	2.90	2.90	3.00	1.65
Foundry coke, prompt...	3.75	3.75	3.75	2.00
Foundry coke, future....	3.50	3.50	3.50	2.15

Metals,	Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	28.00	27.50	27.00	17.75	
Electrolytic copper, N. Y.	27.75	27.37½	26.37½	16.37½	
Spelter, St. Louis.....	18.75	17.50	16.50	9.75	
Spelter, New York.....	19.00	17.75	16.75	9.87½	
Lead, St. Louis.....	7.87½	8.00	7.37½	4.12½	
Lead, New York.....	7.87½	8.00	7.25	4.20	
Tin, New York.....	53.00	50.62½	54.00	57.00	
Antimony, Asiatic, N. Y.	43.00	45.00	44.00	21.00	
Tin plate, 100-lb. box, P'gh	\$4.50	\$4.50	\$4.25	\$3.25	

also reported of 3000 tons of basic at close to \$18 at furnace. The local demand for Bessemer, foundry and basic iron is quiet. We note a sale of 500 tons of No. 2 foundry for last half of the year at \$18.50, Valley furnace. We quote Bessemer iron at \$21; basic, \$18.25; gray forge, \$17.75 to \$18; malleable Bessemer, \$18.50 to \$19, and No. 2 foundry, \$18.50 to \$19, all at Valley furnace, the freight rate from furnace for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

Billets and Sheet Bars.—Some dealers in steel have been able to pick up a few lots of Bessemer and open-hearth billets, which they are offering at considerably less than \$45 per ton, and have made some sales. The mills are quoting \$45 and as high as \$50 for fairly prompt deliveries on Bessemer and open-hearth billets. It is said that on some sliding scale contracts for sheet bars, some consumers are paying considerably above \$40 at mill for second quarter bars. For delivery over the second quarter, and possibly into third quarter, we quote: Bessemer billets, \$45; open-hearth billets, \$45; Bessemer sheet bars, \$45, and open-hearth sheet bars, \$45, maker's mill, Pittsburgh or Youngstown districts. We quote forging billets at \$67.50 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

Steel Rails.—The Pennsylvania Railroad inquiry for rails for 1917 delivery, and which it is said will be for between 175,000 and 200,000 tons, has not yet reached the local makers. No information is given as to the amount of the advance in prices of standard section rails which is expected to be made shortly after May 1. The new demand for light rails is very active and prices are firm. We quote light rails as follows: 25 to 45 lb. sections, 2.10c.; 16 and 20 lb., 2.15c.; 12 and 14 lb., 2.20c., and 8 and 10 lb., 2.25c., in carloads and up to 100 tons. An advance of 5c. per 100 lb. is charged for less than carloads and down to 3 tons, while under 3 tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.25c. and of open-hearth steel, 1.34c., Pittsburgh.

Ferroalloys.—Reports are current that the market on ferromanganese is in better shape as regards supply, but this likely comes from the fact that some con-

sumers who recently received fair-sized shipments on contracts have offered for resale a part of the material on which they have realized profits of \$100 to \$150 per ton, which are very attractive. A sale of this kind of two to three cars was made last week at about \$400 per ton. Importers will not take any more contracts for English ferromanganese for delivery this year, and the great uncertainty as to deliveries on contracts already placed, with the fact that there is practically only one domestic producer, makes a grave situation regarding the future supply. We note sales of about three cars at \$425 to \$450, and quote the market on prompt ferromanganese at \$400 to \$450 per ton. We quote 20 per cent spiegeleisen for forward delivery at \$70 to \$75, but for spot shipment it has sold at \$80. Prices on 50 per cent ferrosilicon are still held on the old levels, but much above these prices would be paid by some consumers for spot delivery. Ruling prices on 50 per cent ferrosilicon are \$85 up to 100 tons; over 100 tons and up to 600 tons, \$84, and over 600 tons, \$83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are as follows: 9 per cent, \$30; 10 per cent, \$31; 11 per cent, \$32; 12 per cent, \$33; 13 per cent, \$34.50; 14 per cent, \$36.50; 15 per cent, \$38.50, and 16 per cent, \$41. Seven per cent silvery for the same delivery is \$26.50; 8 per cent, \$27; 9 per cent, \$27.50; 10 per cent, \$28; 11 per cent, \$29, and 12 per cent, \$30. All these prices are f.o.b. at furnace, Jackson, Ohio; New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of \$2 per gross ton to Pittsburgh.

Structural Material.—Fabricators report a considerable falling off in new inquiry, probably due to the high prices. The American Bridge Company has taken 3000 tons for a shop building for a Western road and 500 to 600 tons of bridge work for the Pennsylvania Railroad. The McClintic-Marshall Company has taken 450 tons for a new steel building for the Crucible Steel Company of America at Syracuse, N. Y. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, for delivery in third quarter and fourth quarter of this year. In small lots for prompt delivery from warehouse shapes are held at 3.25c. to 3.50c. and higher.

Plates.—A leading mill has fixed its price on sheared plates at 3.50c. per lb. for third-quarter delivery, and it is said will not sell at a lower figure. Orders for

steel cars are light, railroads refusing to pay the high prices quoted, which are said to be more than double those named at this time last year. The Solvay Process Company has placed 20 steel hoppers with the Pressed Steel Car Company, and it is said the Union Tank Line has bought 1750 steel tank cars, divided between two builders. We quote $\frac{1}{4}$ -in. and heavier plates for delivery at convenience of the mill, which would be in four to six months, at 2.65c. to 2.75c., and for delivery in two to three months, 3.50c. to 3.75c., maker's mill. Small lots of plates for prompt shipment have sold at 4c. to 4.50c. at mill.

Sheets.—Mills report specifications very heavy, and on the higher grades, such as blue annealed, electrical and deep stamping sheets they are back in shipments 10 to 12 weeks and have their output well sold up for the remainder of this year. Quicker deliveries can be had on light gage black sheets and on galvanized. All the sheet mills are having trouble in getting deliveries of sheet bars, which is restricting output to some extent. We quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3c.; No. 28 Bessemer black, 2.85c. to 2.90c.; open-hearth, 2.95c. to 3c.; No. 28 galvanized, Bessemer stock, 4.90c. to 5c., and open-hearth, 5c. to 5.10c., most mills holding for the higher prices on both grades. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.70c.; Nos. 25, 26 and 27, 2.75c.; No. 28, 2.85c.; No. 29, 2.95c., and No. 30, 3c. These prices are for carload and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—New business is confined to occasional orders for small lots for shipment from stock, consumers being covered on their requirements. Most of the tin-plate mills are suffering for steel, deliveries being very unsatisfactory. For this reason some do very little on Saturdays, preferring to run as full as they can on the first five days of the week. It is believed that all former records for output and shipments will be broken this year. On small lots from stock, mills are getting from \$4.25 to \$5 per base box, prices depending on the sizes wanted and the quantity. We quote 14 x 20 coke plates at \$4.50 per base box, and 8-lb. coated ternes at \$7.50 for 200 lb., and \$7.80 for 214 lb., all f.o.b. maker's mill, Pittsburgh.

Cold-Rolled Strip Steel.—Consumers are now placing contracts for cold-rolled strip steel for third quarter delivery on the basis of \$6 per 100 lb., base. We note one contract of 800 tons for third quarter and another of 3000 to 3500 tons for last half of the year at this price. On specific lots for shipment at convenience of the mill about \$6.50 base and higher are being quoted. The new extras adopted March 15 were given on page 810 in THE IRON AGE of March 30.

Rivets.—The new demand continues heavy, and makers of rivets are very much back in deliveries, due partly to large orders and partly to slow shipments of steel by the mills. The output of rivets is being materially cut down for the latter reason. There is a fairly heavy export demand and recently three or four cars were shipped by local makers to India and Africa. Prices are very firm and likely to be higher. We quote structural rivets, $\frac{1}{2}$ in. and larger, at \$3.25 per 100 lb., base, and conehead boiler rivets, \$3.35, f.o.b., Pittsburgh, terms 30 days net, or one-half of 1 per cent off for cash in 10 days.

Skelp.—This material is in strong demand and prices are firm. Some grades of Eastern iron skelp are being offered in this market at slightly lower prices than local mills are naming. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Wire Products.—The expected advance in prices has not developed. Mills report the new demand for wire nails and plain wire very heavy, but for barb wire it is not as active as expected it would be when spring trade opened up. This is because of the high prices ruling, many consumers deciding to defer buying until fall. Premiums of 10c. per keg for prompt shipment are still being paid for some sizes of nails. Prices quoted by the mills to domestic consumers for delivery at convenience

of the mill are as follows: Wire nails, \$2.40; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50; plain annealed wire, \$2.25; galvanized barb wire and fence staples, \$3.25; painted barb wire, \$2.55; polished fence staples, \$2.55; cement coated nails, \$2.40, base, all f.o.b., Pittsburgh, with freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now $61\frac{1}{2}$ per cent off list for carload lots; $60\frac{1}{2}$ per cent for 1000-rod lots and $59\frac{1}{2}$ per cent for small lots, f.o.b. Pittsburgh.

Wire Rods.—Local makers say that export inquiry is heavy, particularly from Canada, but they are not quoting on these inquiries, needing their entire supply of rods for their own wire mills and for regular customers. It is claimed that rods have sold recently for fairly prompt shipment at close to \$65 per ton. Local makers of rods have their entire surplus output under contract for remainder of this year. We quote Bessemer, open-hearth and chain rods at nominally \$60 at mill.

Railroad Spikes.—The new demand is quiet and specifications from the railroads are not heavy. However, several makers of spikes prefer to put their steel into other products for which there is a greater demand and higher prices ruling. We quote:

Standard railroad spikes, $\frac{1}{2}$ x $\frac{9}{16}$ in. and larger, \$2.65 to \$2.75; railroad spikes, $\frac{1}{2}$ and $\frac{7}{16}$ in., \$2.75 base; railroad spikes, $\frac{3}{4}$ in. and $\frac{5}{16}$ in., \$3.05 base; boat spikes, \$2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—Another advance in prices is expected within a short time. Demand continues very heavy and makers of nuts and bolts say deliveries of steel from the mills are very unsatisfactory and are keeping down output. There is an active export demand, but very little is doing in such orders on account of the embargo. Discounts, which are stated to be for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb.

Machine bolts, h. p. nuts, small, rolled thread, 60, 10 and 5 per cent; small, cut thread, 60 and 10; large, 50 and 10.

Machine bolts, c. p. c. and t. nuts, small, 60 per cent; large, 45.

Carriage bolts, small, rolled thread, 60 and 10 per cent; small, cut thread, 60 and 5; large, 50.

Blank bolts, 50 and 10 per cent. Bolt ends, h. p. nuts, 50 and 10; with c. p. nuts, 45. Rough stud bolts, 30. Lag screws (cone or gimlet point), 65. Forged set screws and tap bolts, 25 per cent.

Nuts, tapped or blank, h. p. square, \$3.25 off; h. p. hex., \$3.25 off; c. p. c. & t. sq. nuts, tapped or blank, \$3.50 off; c. p. c. & t. hex., \$3.50 off. Semi-finished hex. nuts, 70, 10 and 10 per cent; finished and case hardened nuts, 70 and 10.

Rivets, $\frac{7}{16}$ in. in diameter and smaller, 60.

Shafting.—Discounts have again been lowered five points, equal to an advance of \$10 per ton. One local maker took a contract recently for a fairly large amount of shafting for delivery in last quarter at 15 per cent off list. The steady advances in prices of shafting have not curtailed demand, which is as heavy as ever, some consumers sending in their orders and asking the mills to enter them at any prices they see fit. It is stated that a few lots of shafting for prompt shipment have been sold at base price. On some sizes makers cannot promise deliveries under four or five months. We now quote cold-rolled shafting at 20 per cent off in carloads and 15 per cent in less than carloads, f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars.—There seems to be a wide difference on prices of steel bars being quoted by the mills for delivery at their convenience. One local maker is quoting steel bars at 2.50c. to 2.60c. for shipment in third and fourth quarters, while another names 3c. to 3.50c. for delivery in three or four months. Insistent inquiries are in this market for steel rounds, but local mills are not quoting on these, being unable to make the deliveries. The demand for steel bars for reinforcing purposes is not as heavy as expected, due to the falling off in building operations on account of the high prices ruling for labor and materials. The new demand for iron bars is heavy and mills are sold up for three or four months. It is stated that local makers of steel

bars have not sold on contracts to large consumers for delivery beyond this year, except in one or two cases where deliveries run into first quarter of 1917. We quote steel bars at 2.50c. to 2.65c. for delivery in third and fourth quarters, and from 2.75c. to 3c., at mill, for delivery in second quarter. Prices on steel bars from warehouse range from 3.25c. to 3.50c. We quote common iron bars at 2.50c. to 2.60c. and railroad test bars at 2.60c. to 2.70c. at mill.

Hoops and Bands.—The nominal price of steel hoops is 2.75c. and bands 2.50c. for delivery at convenience of the mill, but actual prices being paid on orders for delivery in three or four months are said to run as high as 3c. for hoops and 2.75c. for steel bands.

Merchant Steel.—Mills report their output sold up for four or five months, and any prices being quoted are purely nominal and for delivery at their convenience, which in some cases would not be before fourth quarter. Shipments this month are expected to break all records, and would be still heavier were the supply of cars better. On small lots for shipment at convenience of the mill, which would be in four to six months, prices are about as follows: Iron finished tire, $\frac{1}{2}$ x $1\frac{1}{2}$ in. and larger, 2.35c., base; under $\frac{1}{2}$ x $1\frac{1}{2}$ in., 2.50c.; planished tire, 2.55c.; channel tire, $\frac{3}{4}$ to $\frac{1}{2}$ and 1 in., 2.85c. to 2.95c.; $1\frac{1}{2}$ in. and larger, 3.25c.; toe calk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Carwheels.—The two local makers of steel forged carwheels have taken some fairly large contracts for first quarter and first half of 1917. We quote 33-in. freight carwheels in lots of 1000 or more at \$18; 33-in. tender wheels, \$22; 36-in. passenger or tender wheels, \$26. These prices are based on a 10-in. diameter hub, 50c. extra being charged for 11-in., all f.o.b. Pittsburgh.

Wrought Pipe.—The current demand for iron and steel pipe is very heavy and the obligations on the books of the mills are so large that the best deliveries possible are in July or later. Several steel pipe mills say their orders booked so far this year are away beyond their output. The new demand for line pipe is quiet and no large lines are in the market. This is partly due to the filled-up condition of the mills, and also to the fact that within the past eight or nine months prices on line pipe, 12 in. and larger, have advanced from about \$30 to \$35 per ton to \$60 and \$65 per ton. Discounts on black and galvanized iron and steel pipe are given on another page.

Boiler Tubes.—Makers report the new demand for locomotive and boiler tubes still extremely heavy, and on these products they are sold up for three or four months, specifications being active. On seamless tubing makers are sold up for the remainder of the year, and deliveries are much delayed. Discounts on iron and steel tubes are firm and are given on another page.

Coke.—There is a serious slump in prices of furnace coke for spot shipment, and some grades are offered as low as \$2.50 per net ton at oven. For about three months the blast furnace interests have been carrying heavy stocks of coke on track for fear of a tie-up on the railroads on account of heavy snows or other causes, but this danger is now largely removed, and the railroads insist that the coke on cars be taken in, with the result that some blast furnaces have suspended shipments, and a large amount of coke has accumulated. In addition to this the output is enormously heavy. A local interest reports it has closed several more contracts for blast furnace coke for delivery in last half of the year at \$3 per net ton, and a Western interest has about closed for 8000 to 10,000 tons of furnace coke per month over last half of the year at slightly under \$3 per net ton at oven. A Cleveland interest is in the market for 64,000 tons of blast furnace coke, shipments to be 8000 tons per month, over last eight months of the year. We quote best grades of blast furnace coke for prompt shipment at \$2.75 and other grades at \$2.50, while best makes of blast furnace coke on contracts for last half of the year delivery are from \$2.90 to \$3 per net ton at oven. We quote best grades of 72-hr. foundry coke at \$3.75 to

\$4 for prompt shipment and \$3.50 to \$3.75 on contracts. We note a sale of 40 cars of foundry coke for delivery over the next two months at \$3.75 per net ton at oven. The Connellsville *Courier* gives the output of coke in the Connellsville region for the week ended April 1 as 476,995 net tons, an increase over the previous week of 17,500 tons.

Old Material.—The local scrap market is very quiet and prices are soft. The Carnegie Steel Company, which several weeks ago was a heavy buyer of scrap, has filled its needs and is out of the market. An embargo is on for scrap routed for the Cambria Steel Company, and other large consumers are not buying. Borings and turnings, which were in heavy demand recently, are now very dull, and prices have gone off. We note sales of about 600 tons of cast-iron borings and 2000 to 2500 tons of turnings at \$11, delivered at buyer's mill. The consumer at Brackenridge, Pa., is the only concern that is buying borings and turnings at present. Dealers quote for delivery in the Pittsburgh and near-by districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$18.00 to \$18.25
Hydraulic compressed bundled sheet scrap	16.00 to 16.25
No. 1 foundry cast	16.00 to 16.25
Bundled sheet scrap, side and ends, f.o.b. consumers' mills, Pittsburgh district	14.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	18.00 to 18.25
Bundled sheet stamping scrap	13.00 to 13.25
No. 1 railroad malleable stock	15.50 to 16.00
Railroad grate bars	13.00 to 13.25
Low phosphorus melting stock	20.50 to 21.00
Iron car axles	26.50 to 27.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	29.00 to 29.50
No. 1 busheling scrap	16.00 to 16.25
Machine-shop turnings	10.75 to 11.00
Old carwheels	16.00 to 16.25
Cast-iron borings	11.00 to 11.25
*Sheet bar crop ends	18.00 to 18.50
No. 1 railroad wrought scrap	19.00 to 19.50
Heavy steel axle turnings	14.00 to 14.50
Heavy breakable cast scrap	15.00 to 15.25

*Shipping point.

Chicago

CHICAGO, ILL., April 12, 1916.—(By Wire.)

In the face of a further advance of \$2 per ton for structural steel and bars and \$3 per ton for plates the mills are being more urgently pressed by customers desiring to make reservations for 1917 requirements. It is difficult to discern just what effect on the trade these increases in prices are having, with the market already at an extraordinarily high level. It can only be assumed that there is in progress a gradual elimination of that business which cannot be done as each succeeding higher level of values is reached. That the announcement of the leading interest regarding future rail orders would bring out prompt inquiry for larger reservations as well as hasten the placing of new orders is not surprising. Many such inquiries were received, but as some mills are already scheduled up to September, 1917, on the basis of the raw steel now available to them, rail orders have stood very much as originally entered. New orders taken last week totaled nearly 100,000 tons, of which the largest is that of the Rock Island for 40,000 tons. The buying of track fastenings has been general, the order for 10,000 kegs of oil-treated bolts of the Baltimore & Ohio being of special interest. Export inquiry for about 5000 tons of rails is noted. Generally speaking prices have become prohibitive for structural work except where the quantity needed is very small and can be had under contracts made at the lower prices of a few months ago. The car builders have taken 4650 cars, the Milwaukee Railroad ordering 150 all-steel flat cars of new design from the Bettendorf Company. The outstanding exception to the general situation seems to be black sheets, which but for the general scarcity of semi-finished steel could be bought apparently at the consumer's price. As it is, concessions are being freely quoted. The demand for bar iron has now grown to such proportions as to load the mills with business for seven to

eight weeks in the future. Implement contracts for bars and bolts are under consideration, and some of the implement manufacturers are known to have placed small orders for last half delivery at current prices. There has been a resumption of inquiry for pig iron, one lot of 3000 tons being under negotiation. In the scrap market the nearly complete absence of consumer buying deprives the increasing weakness of the market of significance.

Pig Iron.—Inquiry for Northern iron, which in the preceding week had fallen off noticeably as compared with the activity earlier in the month, last week began again to take on larger proportions. Several lots of 1000 tons, one of 1500 tons of foundry iron and another of 3000 tons, are indicative of the renewed interest. The persistence of buying by melters who have been in the market before and whose normal requirements are now exceeded by their purchases of the last six months, can only be explained on the strength of new business being booked by the foundries. Prices of Northern iron are unchanged. The Southern situation still presents a wide range of prices down from \$16, at which some of the furnace interests are holding for last half deliveries, to \$14.75, which is being quoted for prompt shipment resale iron, on the basis of No. 2 at Birmingham. For strictly furnace iron the Southern market is \$15 for second quarter, and \$15.50 for last half. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$19.75
Lake Superior charcoal, No. 1.....	20.25
Lake Superior charcoal, No. 6 and Scotch....	20.75
Northern coke foundry, No. 1.....	19.50
Northern coke foundry, No. 2.....	19.00
Northern coke foundry, No. 3.....	18.50
Southern coke, No. 1 f'dry and 1 soft, \$19.50 to	20.00
Southern coke, No. 2 f'dry and 2 soft, 19.00 to	19.50
Malleable Bessemer	19.50
Basic	19.00
Low phosphorus	34.00 to
Silvery, 8 per cent	29.50
Bessemer ferrosilicon, 10 per cent.....	33.50

Cast-Iron Pipe.—New business in sight is limited to several small jobs ranging from 100 to 200 tons. Prices for pipe are quoted with every indication of firmness, which strength is more largely due to the price of pig iron than the volume of work in the pipe foundries. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$33.50 to \$34; 6 in. and larger, \$30.50 to \$31, with \$1 extra for class A water pipe and gas pipe.

(By Mail)

Rails and Track Supplies.—As was expected, the announcement of the leading interest, with its uncertainty as to the future of rail prices, brought out a flood of inquiry for additional rails. At the rate at which raw steel is being allotted to the local mill, there is little prospect of output being equal to augmented requirements, at least for delivery prior to September of next year. New orders booked last week aggregated nearly 100,000 tons. The Chicago, Rock Island & Pacific took 40,000 tons; the total taken by the Northern Pacific is understood to be 35,000 tons; the Wabash has closed for 7000 tons. These with smaller lots approximated the total above mentioned. The railroads are rapidly closing for track fastenings and sales of the week were of size and importance. An interesting order was that of the Baltimore & Ohio for 10,000 kegs of oil-treated bolts placed with the local mill. Inquiry for rails of 80 and 85-lb. section, for Cuba and South America, calls for about 5000 tons. There is inquiry also for some 5000 tons of tie-plates. We quote standard railroad spikes at 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, \$50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.70c.; 16 to 20 lb., 1.75c.; 12 lb., 1.80c.; 8 lb., 1.85c.; angle bars, 1.50c. to 1.75c., Chicago.

Structural Material.—The activity of the leading fabricator in competition for the work recently offered is an interesting phase of the situation. Contracts

taken last week by the American Bridge Company include 875 tons for the blooming mill at Gary, 325 tons for the Garfield Smelting Company, Garfield, Utah, and 435 tons for the telephone building at Wichita, Kan. Other awards were 215 tons for a bridge at Omro, Wis., to the Wausau Iron Works; 320 tons for the Garfield Smelting Company to the Wisconsin Bridge Company and 365 tons of tractor wheels for the Wilcox Motor Car Company to French & Heck, Davenport, Iowa. Car orders reported placed in the week included 1000 box cars for the Wabash and 1000 for the Southern, both taken by the American Car & Foundry Company; 1000 steel underframes for the Queen & Crescent, placed with the Western Steel Car & Foundry Company; 500 automobile cars for the Burlington, also taken by the American Car & Foundry Company, and 1000 box cars for the Southern, awarded to the Mount Vernon Car Mfg. Company. All other car inquiry is reported as being withdrawn. Contract prices for structural steel have been advanced \$2 per ton, and we quote for Chicago delivery from mill 2.639c.

We quote for Chicago delivery of structural steel from jobbers' stocks 3.10c.

Plates.—The mills are receiving a rapidly increasing number of requests for 1917 reservations, and there is the possibility of a yielding to the importunities of customers to the extent of restricted tonnages. Another advance of \$3 in the price of plates is announced, increasing further the spread between plates and structural shapes. The buying of locomotives includes 20 for the Missouri Pacific, 10 for the Nickel Plate and 6 for the Chicago, Indianapolis & Louisville. We quote for Chicago delivery of plates from mill against contracts 2.939c. and for prompt shipment 3.439c.

We quote for Chicago delivery of plates from jobbers' stocks 3.50c.

Sheets.—The demand for sheets, other than blue annealed and special-finish grades, continues in marked contrast to the call for most finished steel products. The situation with respect to galvanized sheets requires no comment, but the shading of prices for one-pass sheets, especially where open-hearth sheets are in competition with sheets rolled from Bessemer bars, and the easy deliveries of four weeks and less are an interesting exception to general conditions. For one-pass sheets less than 2.85c. is being done, as compared with a minimum of 3c., Pittsburgh, for automobile and blue-annealed sheets. Prompt shipment specifications for the latter cannot be placed at less than 3.25c., Pittsburgh. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.189c.; box annealed, No. 17 and higher, 3.039c. to 3.189c.; No. 28 galvanized, 4.939c. to 5.189c.

Blue annealed sheets from store have been advanced \$3 per ton and we quote for Chicago delivery from jobbers' stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—Bar-iron mills have begun to feel the flood of business and the last fortnight has brought them orders considerably in excess of their capacity to deliver, in the period for which they are willing to contract. Quotations of seven and eight weeks represent the conditions prevailing with practically all of the mills. Despite their efforts to win an amelioration of the hardship of present prices, purchases of steel bars by implement interests at prices as high as 2.35c., Pittsburgh, are reported, while inquiry generally appears to accept the limitation of contracts to six months. The price of steel bars has been advanced \$2. We quote mill shipments, Chicago, as follows: Bar iron, minimum, 2.35c.; soft steel bars, 2.639c.; hard steel bars, 2.50c. to 2.75c.; shafting, in carloads, 30 per cent off; less than carloads, 25 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base, with 5c. extra for twisting in sizes 1½ in. and over and usual card extras for smaller sizes; shafting 15 per cent off.

Rivets and Bolts.—With scarcely an exception, the bolt and nut manufacturers report an embarrassing pressure of new business. The very high level of prices appears to be of little avail as a deterrent. The agri-

cultural implement manufacturers are beginning to negotiate for last half contracts, but it is not expected that there will be a closing of much of this business for perhaps 30 days. We quote as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 60-10; cut thread, 60-5; larger sizes, 50; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 60-10-5; cut thread, 60-10; larger sizes, 50-10; gimlet point coach screws, 65; hot pressed nuts, square, \$3.25 off per 100 lb.; hexagon, \$3.25 off. Structural rivets, $\frac{3}{4}$ to $1\frac{1}{4}$ in., 3.30c. to 3.40c., base, Chicago, in carload lots, boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 65-5; larger sizes, 65; carriage bolts up to $\frac{3}{4}$ x 6 in., 65; larger sizes, 50-15 off; hot pressed nuts, square, \$3.70, and hexagon, \$3.80 off per 100 lb., lag screws, 65-10-5.

Wire Products.—The expected advance in wire products has not yet been announced. There is some evidence that the high level of prices reached by recent increases, following each other in rapid succession, has already operated to postpone buying in farming districts, particularly of wire for fencing. But plain wire and nails are moving in unchecked volume. We continue to quote to jobbers as follows: Plain wire, No. 8 and coarser, base, \$2.439; wire nails, \$2.589; painted barb wire, \$2.739. galvanized barb wire, \$3.439; polished staples, \$2.739; galvanized staples, \$3.439, all Chicago.

Old Material.—The absence of consumer buying of any importance takes from the current market what little significance the limited activity might otherwise have. Such purchases of scrap as are made clearly indicate how far the weakness of the market has developed. Heavy melting steel is holding fairly well, and doubtless the market would react at once to prices above \$17 at the appearance of any inquiry of size. But shoveling steel is decidedly weak and, correspondingly, No. 2 wrought is relatively much weaker than No. 1 wrought. Weakness is also emphasized in turnings and both light and heavy cast scrap. Very little is indicated, however, by the transactions of the week, as a sharp adjustment would be certain to follow upon the resumption of buying by melters. The Great Northern is offering 4000 tons of scrap, of which 3000 tons is steel rail. The Michigan Central has 1250 tons; the Big Four, 3000 tons, and the Vandalia, 1000 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	\$18.00 to \$18.50
Relaying rails	19.50 to 20.50
Old carwheels	14.00 to 14.50
Old steel rails, rerolling	18.00 to 18.25
Old steel rails, less than 3 ft.	19.00 to 19.50
Heavy melting steel scrap	16.50 to 17.00
Frogs, switches and guards, cut apart	16.50 to 17.00
Shoveling steel	16.00 to 16.25
Steel axle turnings	11.75 to 12.25

Per Net Ton

Iron angles and splice bars	\$18.50 to \$19.00
Iron arch bars and transoms	19.75 to 20.25
Steel angle bars	15.75 to 16.00
Iron car axles	24.00 to 24.50
Steel car axles	26.50 to 27.00
No. 1 railroad wrought	17.00 to 17.50
No. 2 railroad wrought	15.75 to 16.00
Cut forge	15.75 to 16.25
No. 1 busheling	13.75 to 14.25
No. 2 busheling	10.25 to 10.50
Pipes and flues	12.50 to 12.75
Steel knuckles and couplers	15.50 to 16.00
Steel springs	16.00 to 16.50
No. 1 boilers, cut to sheets and rings	12.25 to 12.50
Roller punchings	14.00 to 14.50
Locomotive tires, smooth	18.50 to 19.00
Machine shop turnings	8.00 to 8.50
Cast borings	7.00 to 7.50
No. 1 cast scrap	13.00 to 13.50
Stove plate and light cast scrap	11.00 to 11.50
Grate bars	11.00 to 11.25
Brake shoes	11.25 to 11.50
Railroad malleable	14.00 to 14.50
Agricultural malleable	11.50 to 12.00

The Thompson-Starrett Company, New York City, has been awarded the contract and has already started work on the addition to the Bethlehem Steel Company's main office building at South Bethlehem, Pa. The extension will be 140 x 160 ft., seven stories, and designed so that two additional stories may be added later.

Philadelphia

PHILADELPHIA, PA., April 11, 1916.

A more conservative spirit is shown in the matter of prices for steel products. Quotations for plates, shapes and bars stand where they were a week ago, and mill representatives say they hope and believe that the end has come to headlong advances. Not all agree on the effect of the high price levels. Some believe that business is being limited by the high cost of material; others find the volume of business is just as heavy as ever. As a matter of fact, the situation is a little contradictory for the reason that some prices were radically advanced for the express purpose of keeping buyers away, but without success. On the other hand, some structural projects of an investment character are temporarily side-tracked because of the abnormal cost of building. All of the mills are in a position where they would rather welcome the opportunity of catching up on deliveries to a reasonable extent. So far orders booked have dwindled but little, if at all. Pig iron is strong, generally, and the trade is convinced that a higher market is to be expected, not only because of the demand but because of the higher furnace costs. Low phosphorus is quoted \$1 higher. Basic is dull, and there is evidence of some pressure to sell. Nearby ferromanganese appears to be a shade easier; future deliveries are unchanged, although only limited quantities are offered. Coke is uncertain, two of the leading makers having withdrawn from the market. Offerings of old material have been much freer. Labor troubles are cropping up at one or two eastern Pennsylvania points, one result of which has been the release of some unfinished material for the market.

Ferroalloys.—The situation is but little changed. Limited quantities of 80 per cent ferromanganese are available for the last quarter at \$200, seaboard, and \$175 for the first quarter. Prompt is reported a trifle easier, but the general sentiment is that about \$400 is the price. In the course of a few weeks domestic ferromanganese, made at Lebanon and Sheridan, Pa., is expected to appear on the market. Sales of 20 per cent spiegeleisen are reported at \$70, furnace.

Pig Iron.—The market has been rather quiet. Prices are strong, but quotations cover an unusually wide range. Some makers of eastern Pennsylvania No. 2 X ask \$20.50, furnace, for prompt or third quarter delivery, equal to about \$21.25, Philadelphia, yet \$20.50, Philadelphia, can be done without much difficulty, the explanation of the difference being that some interests are not really anxious to sell. A fair range would be \$20.50 to \$21, Philadelphia. The Baldwin Locomotive Works is in the market for 1000 to 1500 tons of low silicon iron and 2000 to 3000 tons of high silicon for third quarter delivery. An offering of gray forge at \$19, furnace, the iron being wanted by a consumer in eastern New York, did not fetch business. Virginia makers find it easier to supply customers in New England whom they could not reach a few days ago. They are permitted to ship to these points provided they use a roundabout route which avoids the rails of the Pennsylvania Railroad. Basic has been so quiet as to justify the statement that there is no market. It has been offered at \$20.50, delivered, and \$20.50 to \$21 is a conservative range of prices for this grade. Some sellers ask considerably more. Mention is made of a sale for delivery in the latter part of this year and first part of next at \$22, furnace, but if such a sale was made it is believed that special iron must be involved. One or two steel companies which have a surplus of basic would like to sell. Low phosphorus has continued active, and, following sales at higher prices, the quotation has again been advanced \$1, making the new price \$34, Philadelphia. The makers are pretty well sold up. Lebanon low phosphorus is unchanged at \$30 to \$32, furnace, the makers not having been actively seeking business. The iron trade is optimistic, and arguments that prices will continue to advance are frequently heard, the basis of all being the opinion of the increased furnace costs. It is pointed out that labor, coke and even the materials used in the laboratories have advanced in price. Business in foreign ore is at a standstill, while some of the

available domestic ore is objectionable for the reason that it produces less iron than ore formerly used, and at the same time requires more fuel. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry.....	\$20.50 to \$21.00
Eastern Pa., No. 2 plain.....	20.25 to 20.75
Virginia, No. 2 X foundry.....	21.25
Virginia, No. 2 plain.....	20.75
Gray forge	19.00 to 19.50
Basic	20.50 to 21.00
Standard low phosphorus.....	34.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended April 8 consisted of 9383 tons from Sweden and 7700 tons from Cuba.

Plates.—All of the eastern Pennsylvania makers agree on 3.75c., Pittsburgh, or 3.909c., Philadelphia. The mills continue under great pressure. One is sold up to the end of the year, except for odds and ends, and is concentrating on taking care of its customers, while another has nothing to sell for six months. All are endeavoring to shorten their deliveries.

Bars.—The quotation for steel bars continues nominal at the Pittsburgh base of 2.75c., equal to 2.909c., Philadelphia. Prompt bars are difficult to procure except from warehouse stocks. The makers of iron bars have advanced their prices and now quote 2.659c., Philadelphia, for carload lots, less than carloads taking \$3 per ton more. The mills are filled for three or four months, and the demand is greater than at any previous time this year. With the approach of July 1, more steel rounds for shell-making will be sought. An offer of 4.25c. for 10,000 tons was declined here because July and August deliveries were wanted.

Structural Material.—The demand continues strong, especially for material required in a number of small jobs. Several investment propositions involving a large outlay are held up, but the accumulation of these must bring action in the long run. Eastern Pennsylvania mills continue to quote 3.159c., Philadelphia.

Billets.—Forging steel is finding a ready sale at \$65, but the leading makers have nothing to sell this quarter. Open-hearth rerolling billets are firm at \$50 to \$55.

Sheets.—Makers are so well sold up that there is little new business reported by eastern Pennsylvania mills, but specifications are active. Quotations range from 3.909c. to 4.159c., Philadelphia, for No. 10 blue annealed.

Coke.—Two of the leading producers have withdrawn from the market. Quotations vary a great deal, and prompt furnace is a trifle easier, presumably because of the improved railroad freight conditions. Prompt furnace is quoted at about \$3.25 to \$3.50 per net ton at oven, and last half at about \$3. Prompt foundry is about \$4 per net ton at oven, and contract at \$3.50.

Old Material.—Freer offerings, brought out by prevailing prices, have imparted an easier tendency to the market, especially for heavy melting steel and borings and turnings. The freight situation is improved, but is yet far from normal. Turnings are lower. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$18.00 to \$18.50
Old steel rails, rerolling.....	19.00 to 20.00
Low phos. heavy melting steel scrap.....	22.50 to 23.25
Old steel axles	26.00 to 27.00
Old iron axles	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	17.50 to 18.00
No. 1 railroad wrought	23.50 to 24.50
Wrought-iron pipe	15.50 to 16.00
No. 1 forge fire	15.50 to 16.00
Bundled sheets.....	15.00 to 16.00
No. 2 busheling	11.00 to 11.50
Machine shop turnings.....	11.00 to 11.50
Cast borings	11.50 to 12.00
No. 1 cast	18.00 to 18.50
Grate bars, railroad	14.00 to 14.50
Stove plate	14.00 to 14.50
Railroad malleable	15.00 to 15.50

Industrial accidents in Pennsylvania in March killed 239 employees and injured 26,732, according to figures just announced by John Price Jackson, commissioner of labor and industry.

Cincinnati

CINCINNATI, OHIO, April 12, 1916.—(By Wire.)

Pig Iron.—Only a few contracts for this year's shipment were made last week. An Indiana melter bought 1500 tons of Northern iron for last half delivery and a central Ohio consumer took 500 tons of Southern iron for delivery in the third quarter, both of which contracts were made at scheduled prices. A few scattered lots were sold for shipment in the first half of next year. An Ohio consumer bought for that delivery approximately 1700 tons of Northern iron, and a round lot of Southern iron was also sold to a southern Ohio melter. A local manufacturer contracted for 1500 tons of mixed Northern and Southern foundry iron, also for first half shipment. Local merchants are figuring on an inquiry for 1500 tons of Northern foundry iron from central Ohio, and a melter in southern Illinois is also feeling around for a first half supply that will total about 1000 tons. A Southern furnace that was willing to book orders last week at \$15.50, Birmingham basis, for delivery in the first half of 1917, now refuses to consider such business below \$16, which is generally named by sellers with the exception of those who are holding out for \$16.50. For April to June delivery, \$15, Birmingham basis, can be done, but \$15.50 for last quarter is named. Resale iron continues to affect the Northern market, and a few small sales for prompt shipment have been made below \$18.50, Ironton. The furnace price is firm at \$19 for the remainder of the year, and contracts for the first half of next year have been made at the same figure. Ohio silvery irons are now very strong at \$27 at furnace. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$18.40 to \$18.90
Southern coke, No. 2 f'dry and 2 soft.....	17.90 to 18.40
Southern coke, No. 3 foundry.....	17.40 to 17.90
Southern No. 4 foundry.....	16.90 to 17.40
Southern gray forge	16.40 to 16.90
Ohio silvery, 8 per cent silicon.....	28.26 to 28.76
Southern Ohio coke, No. 1.....	21.26
Southern Ohio coke, No. 2.....	20.26
Southern Ohio coke, No. 3.....	19.76
Southern Ohio malleable Bessemer.....	20.26
Basic, Northern	20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel.....	25.40 to 25.90

(By Mail)

Old Material.—In some quarters a slight slump was reported in business last week, but on the whole the situation is considered quite satisfactory. A few advances have been made of 50c. per ton, notably on bundled sheet scrap and old iron rails. The minimum figures given below represent what dealers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards.

Per Gross Ton

Bundled sheet scrap.....	\$13.00 to \$13.50
Old iron rails.....	17.00 to 17.50
Relaying rails, 50 lb. and up.....	22.00 to 22.50
Rerolling steel rails.....	16.00 to 16.50
Heavy melting steel scrap.....	15.25 to 15.75
Steel rails for melting.....	14.50 to 15.00

Per Net Ton

No. 1 railroad wrought.....	\$14.50 to \$15.00
Cast borings	6.50 to 7.00
Steel turnings	6.50 to 7.00
Railroad cast scrap.....	12.25 to 12.75
No. 1 machinery scrap.....	14.00 to 14.50
Burnt scrap	9.00 to 9.50
Iron axles	20.50 to 21.00
Locomotive tires (smooth inside).....	17.50 to 18.00
Pipes and flues.....	10.50 to 11.00
Malleable and steel scrap.....	12.00 to 12.50
Railroad tank and sheet scrap.....	9.50 to 10.00

Finished Material.—The local store price of cold rolled rounds has been advanced to 8 per cent over the list. Plates, squares and hexagons are 10 per cent above list, and No. 10 blue annealed sheets in stock are now quoted at 3.50c. Galvanized sheets are so scarce that it is hard to ascertain the correct warehouse price, but 5.50c. can easily be obtained. The mill price on No. 28 galvanized sheets is around 5.15c. to 5.20c. Cincinnati, or Newport, Ky., and on No. 28 black 3.15c. to 3.25c. We quote from warehouse stocks as follows: Steel bars, 3.20c., twisted steel bars, 3.35c.; plates, 3.50c.; small structural shapes, 3.20c. The jobbers'

price on wire nails is strong at \$2.65 per keg and on bar wire \$3.50 per 100 lb.

Coke.—Foundry contracting is lighter. Consumers have been buying heavily for the past 30 days, and the majority now have their future requirements fairly well covered. A little 48-hr. coke for domestic use has been bought, but there are no large furnace contracts in sight. Prompt shipment Connellsville prices are easing off and furnace coke can be bought around \$2.50 to \$3 per net ton at oven, and foundry coke from \$3.50 to \$3.75, which figures also represent the general contract quotations. Wise County and Pocahontas brands are held around the same prices, but New River foundry coke still ranges from \$4.25 to \$4.50.

Cleveland

CLEVELAND, OHIO, April 11, 1916.

Iron Ore.—There will be less Lake Superior ore on the lower Lake docks May 1 than on that date in any year since 1907. On April 1 the amount was 4,894,495 gross tons, or less than on that date in many years. On May 1, 1907, only 2,187,962 tons of ore remained on the docks. Shipments from the docks in March were 1,347,130 gross tons, breaking all previous March records for movement from the docks to furnace yards. The stocks on docks April 1 were 1,967,345 tons less than on the same date a year ago. With the late opening of navigation and the heavy demand for ore, April dock shipments will be large, probably exceeding 1,500,000 tons, so that there will be less than 3,500,000 tons of ore left on the docks May 1. Ore shipments during the first three months this year reached a total of 3,094,822 tons. Reports from the upper Lake ports indicate that navigation will not open at the head of the Lakes before about April 25. However, a start may be made from Escanaba a little earlier. We quote as follows for ore delivered at lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.70; Mesaba non-Bessemer, \$3.55.

Pig Iron.—Some sales of foundry iron are being made for the first half of 1917 at the prices that prevail for last half. Among these is one lot of several thousand tons by a Cleveland interest to a northern Ohio consumer at \$19 for No. 2. Aggregate pig-iron sales in March by furnaces in Ohio territory and including Detroit and Erie furnaces are reported to have exceeded 450,000 tons. The market has apparently settled down to a quiet spell and most foundries are now under cover for at least the greater part of their requirements for last half delivery. Most foundries, except a few that are taking contracts for castings for next year's delivery, are not inclined to buy for that delivery at the prevailing prices and some of the producers are unwilling to sell for shipment beyond January 1. Most furnaces are so well filled up on last half business that it is expected that additional orders which develop later will clean up about all their available output. Local prices are unchanged, representing a spread of \$18.50 to \$19 at furnaces for No. 2. Southern iron is not active. We quote, delivered Cleveland, as follows:

Bessemer	\$21.95 to \$22.45
Basic	19.00 to 19.25
Northern No. 2 foundry	19.00 to 19.50
Southern No. 2 foundry	19.00 to 19.50
Gray forge	18.50
Jackson Co. silvery, 8 per cent silicon	28.62
Standard low phos., Valley furnace	32.00

Coke.—The foundry coke market has quieted down. Most consumers are now under contract for either the last half or full year. The recent buying was very heavy and a number of leading producers are so well sold up for last half that they have withdrawn prices. We quote standard Connellsville foundry coke at \$3.50 to \$3.75 per net ton at oven for contracts and \$3.75 to \$4 for prompt shipment. Furnace coke is weak, being quoted around \$2.50 to \$2.75 for prompt shipment.

Finished Iron and Steel.—The new demand is active although not as heavy as it has been. However, it is becoming harder every day to buy steel, as more mills are turning down all inquiries until they can catch up some-

what on deliveries. Several of the Ohio sheet mills are sold up so far ahead that they are declining to book orders at present. The demand for plates continues heavy and sales are being made at a range in prices from \$3.25c. to 4c., Pittsburgh. Considerable new structural work is coming out, and some fabricators are hampered by their inability to secure steel. The general contract for the West Ninth Street Terminal warehouse, Cleveland, requiring about 2000 tons of structural material and reinforcing bars, has been awarded to the C. A. Turner Company, New York. The Van Dorn Iron Works has taken 1000 tons for the Masonic Temple in Cleveland. The McMyler Interstate Company has taken a car dumper for the Erie Railroad requiring 400 tons. An Ohio railroad has an inquiry out for 5000 tons of rails for 1917 delivery, and there is a large number of inquiries for carload lots of standard rails for traction and industrial companies, orders for which are hard to place. Hard steel bars are selling at 2.75c., Pittsburgh. Bar iron is quoted at 2.40c. to 2.50c., Pittsburgh. Shafting prices have advanced to 20 per cent off for carload lots and 15 per cent for less than carloads. A local mill is selling forging billets at \$60, Cleveland. The demand for sheets has increased, particularly for galvanized sheets, and some mills have advanced prices on the latter to 5.30c. for No. 28, but are quoting No. 20 and heavier on the basis of 5.10c. at mill. We quote black sheets at 2.90c. to 3c. for No. 28; blue annealed sheets at 3c. for No. 10, and galvanized sheets at 5c. to 5.30c. for No. 28. The demand for steel from warehouse continues very heavy, but prices are unchanged at 3.25c. for steel bars and structural material; 3.65c. for plates; 3.50c. for blue annealed sheets and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—Bolt and nut makers have not opened their books for contracts for delivery after July 1, but expect to do so shortly. The demand continues heavy both in current orders and specifications on contracts. The rivet market continues very active. The demand from shipyards and car builders is heavy. We quote rivets at 3.25c., Pittsburgh, for structural and 3.35c. for boiler for carload lots for second quarter delivery with an advance of \$3 per ton for the third quarter. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 6 in., smaller or shorter, rolled thread, 60 and 10; cut thread, 60 and 5; larger or longer, 50; machine bolts with h. p. nuts, $\frac{3}{4}$ x 4 in., smaller and shorter, rolled thread, 60, 10 and 5; cut thread, 60 and 10; larger and longer, 50 and 10; lag bolts, gimlet or cone point, 65; square h. p. nuts, blank or tapped, \$3.25 off the list; hexagon, h. p. nuts, blank or tapped, \$3.25 off; c. p. c. and t. square nuts, blank or tapped, \$3 off; hexagon nuts, all sizes, \$3.50 off; cold pressed semi-finished hexagon nuts, all sizes, 70, 10 and 10 off.

Old Material.—The market is dull and weak. With improved weather conditions an enormous amount of scrap is being shipped to the mills on former contracts, and in many cases this is being delivered faster than it can be taken care of. As a result a number of mills, including Canton and Lowellville, are holding back on shipments. Consumers are not actively in the market for additional scrap and are buying only what is offered at very attractive prices. While few quotations are changed it is probable that most prices can be shaded. Heavy melting steel is nominally \$17.25. Steel rails are soft and have sold down to \$17. Borings are a drug on the market. In spite of the weakness of railroad scrap offered during the past few days it is understood in most cases to have brought very good prices. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails	\$17.00 to \$17.50
Old iron rails	19.00
Steel car axles	26.00
Heavy melting steel	17.25
Old carwheels	14.00 to 14.50
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	14.25 to 14.75
Railroad malleable	17.00 to 17.50
Steel axle turnings	13.25 to 13.50
Light bundled sheet scrap	14.00 to 14.25

Per Net Ton

Iron car axles	\$25.00 to \$24.00
Cast borings	8.25 to 8.50
Iron and steel turnings and drillings	8.00 to 8.25
No. 1 busheling	14.00 to 14.50
No. 1 railroad wrought	17.50 to 18.00
No. 1 cast	14.25 to 14.75
Railroad grate bars	11.75 to 12.00
Stove plate	11.75 to 12.00

Birmingham

BIRMINGHAM, ALA., April 10, 1916.

Pig Iron.—April came in with activity but settled down the first week and has been extremely quiet since so far as buying is concerned. Prices have, if anything, hardened around the lower rather than higher levels. Spot is still quoted by one maker at \$15 and the rule for second half is \$15.50. Some ask \$16 for second half, but will take \$15.50 in competition. All agree that that is the basis on which business may be done except in a few instances, where 50c. additional is obtained. More spot goes at \$15.50 than second half at \$16. One or two interests seem to be out of the market and active solicitation does not appear anywhere. In spite of the record production of Alabama stacks in March, the highest monthly record by 7000 tons, stocks on yards increased only 3000 to 4000 tons. This increase may be charged altogether to the car shortage, which has delayed movements. The shortage is a serious matter, but has not yet served to curtail production except in the case of coal and coke. Furnaces and mills are alike in fine working condition, Alice furnace having broken its record with a monthly output of 11,000 tons, the blooming mill at Ensley with 70,000 tons and the open-hearth department with 84,000 tons. The Alabama Company officially states that its long idle stack at Gadsden will resume as soon as repairs can be completed and will use the company's own raw materials. A favorable report has been made by experts on the furnace plant of the Woodstock Iron Company, which indicates that efforts to organize a company to operate the plant may prove successful. The presence of the executive of the leading pipe interest in the Birmingham district recently was not followed by announcement of large sales made. Pipe and radiator people hold much of the 90,000 tons of warrants on Alabama yards. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$15.50 to \$16.00
No. 2 foundry and soft.....	15.00 to 15.50
No. 3 foundry.....	14.50 to 15.00
No. 4 foundry.....	14.25 to 14.75
Gray forge.....	14.00 to 14.50
Basic.....	15.00 to 15.50
Charcoal.....	23.00 to 23.50

Cast-Iron Pipe.—The pipe market shows no special activity but orders are sufficient to maintain steady operations. Municipalities are sounding the market, but threatened advances have not yet stimulated them into much new heavy buying. One large Uruguay order has been booked, and the early return from South America of J. R. McWane, of the American Cast Iron Pipe Company, is expected to mean more business in that direction. The sanitary pipe situation has changed for the better. An advance in wages has been granted the pattern makers in the large shop of the leading interest at Bessemer. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$28; 6-in. and upward, \$25, with \$1 added for gas pipe and 16-ft. lengths.

Old Material.—There have been sharp rises in the old material market on account of the disappearance of low-priced pig iron. Fancy prices are obtained for old steel axles when available for carload shipment, but the quantity is not large. One seller claims to have received as high as \$22, and another \$19 to \$21, while the average dealer quotes \$16 to \$16.50. The cause for these high prices is that they are being used as billets for the manufacture of shrapnel. When purchased for such use the high prices named are secured. Accuracy in quotations is therefore scarcely possible. The general demand for scrap is quite good. We quote, per gross ton, f.o.b. Birmingham district yards, as follows:

Old steel axles.....	\$18.00 to \$19.00
Old steel rails.....	13.50 to 14.00
No. 1 steel scrap.....	11.00 to 11.50
No. 1 wrought scrap.....	11.00 to 11.50
No. 1 cast scrap.....	11.25 to 11.75
Heavy cast scrap.....	10.50 to 11.00
Stoveplate and light.....	9.75 to 10.25
Old carwheels.....	11.00 to 11.50
Tram carwheels.....	10.25 to 10.75

Coal and Coke.—Coke has advanced to \$4.25 per net ton at oven for Brookwood and \$4.50 for Yolande, with a minimum of \$4 for run of ovens of the former grade. Indications are for still higher prices. The demand

from the Pacific coast is strong; Alabama coke replacing that which came formerly from abroad for use in the sugar refineries. Other consumers are glad to get the coke diverted from Mexico. Furnace coke, where obtainable, brings \$3.50 per net ton. Coal is not active, owing to the season. The car shortage hampers operations.

St. Louis

ST. LOUIS, Mo., April 10, 1916.

Pig Iron.—Sales of small lots were numerous in the past week. There was one large sale of 5000 tons of basic by the Inland Steel Company, the Laclede Steel Company being the purchaser. Other sales included one of 400 tons of No. 2 soft Southern and one of 500 tons of Northern No. 2 foundry. Prices are very firmly held.

Coke.—Sales are largely on the pressing need basis and prices made are subject to the immediate conditions surrounding the buyer and seller. By-product coke of local plants is well sold up.

Finished Iron and Steel.—The situation is entirely one of delivery. Structural material is in increased demand and in consequence the warehouses are getting their prices easily. All fabricators are busy and report steadily increasing business on the boards of the architects for spring and summer. A sale of 15,000 tons of standard rails to the Wabash was split because of the inability of the Lackawanna Company to make deliveries this summer. Light rails are firm, but quiet. Track fastenings are in very active request. Movement out of warehouse has increased and quotations for stock are as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.45c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5.60c.

Old Material.—The market has sagged somewhat following its previous softening tendency, accentuated by the heavy offerings of the railroads, following those of last week, coupled with embargoes by some of the mills. The Helmbacher plant on the west side of the river, the National Enameling and Stamping Company and some others are refusing any material at present. Lists out during the week include 4300 tons from the Southern, 1000 tons from the Louisville, Henderson & St. Louis; 1200 tons from the Vandalia; 3700 tons from the Missouri, Kansas & Texas; 1000 tons from the Mobile & Ohio; 3300 tons from the Big Four; 3000 tons from the Union Pacific; 500 tons from the Cotton Belt, as well as small lots from the Great Northern and Michigan Central. Under the influence of these and previous offerings dealers began to move cautiously, so that quotations by dealers for scrap f.o.b. customers' works, St. Louis industrial district, are as follows:

Per Gross Ton

Old iron rails.....	\$17.25 to \$17.75
Old steel rails, rerolling.....	17.25 to 17.75
Old steel rails, less than 3 ft.....	16.75 to 17.25
Relaying rails, standard section, subject to inspection.....	22.00 to 23.00
Old carwheels.....	13.00 to 13.25
No. 1 railroad heavy melting steel scrap.....	16.25 to 16.75
Heavy shoveling steel.....	14.75 to 15.25
Frogs, switches and guards cut apart.....	16.25 to 16.75
Bundled sheet scrap.....	10.75 to 11.25

Per Net Ton

Iron angle bars.....	\$16.25 to \$16.75
Steel angle bars.....	14.25 to 14.75
Iron car axles.....	22.75 to 23.25
Steel car axles.....	25.00 to 25.50
Wrought arch bars and transoms.....	18.75 to 19.25
No. 1 railroad wrought.....	16.50 to 16.75
No. 2 railroad wrought.....	16.00 to 16.50
Railroad springs.....	15.75 to 16.25
Steel couplers and knuckles.....	15.25 to 15.75
Locomotive tires, 42 in. and over, smooth inside.....	18.25 to 18.50
No. 1 dealers' forge.....	12.25 to 13.25
Mixed borings.....	8.75 to 9.25
No. 1 busheling.....	13.75 to 14.25
No. 1 boilers, cut to sheets and rings.....	10.00 to 10.25
No. 1 railroad cast scrap.....	12.75 to 13.25
Stove plate and light cast scrap.....	9.75 to 10.25
Railroad malleable.....	11.75 to 12.25
Agricultural malleable.....	10.75 to 11.25
Pipes and flues.....	10.75 to 11.25
Railroad sheet and tank scrap.....	10.75 to 11.25
Railroad grate bars.....	9.75 to 10.25
Machine shop turnings.....	10.25 to 10.75

New York

NEW YORK, April 12, 1916.

Pig Iron.—In a way that has been observed before, this year, the market has shown rather more inquiry as well as buying in the past week after a quiet period that seemed to indicate a lull. Transactions amounted to 20,000 tons or more in this district, including Connecticut, but the most of this business went to two firms. One New England buyer has taken 5000 tons of foundry iron for delivery in the second and third quarters. Eastern Pennsylvania furnaces had more trouble in March from irregularity in coke, and with embargoes operating against them accumulated a small amount of iron, chiefly off grades. This has had no effect, however, on the price of standard irons. Furnace companies are spending a good deal of time in tracing shipments, and another feature of the embargoes is claims for extension of time on settlements, in view of doubt as to what iron has been received. A Schenectady company is in the market for 5000 tons, of which 4000 tons is foundry iron below 2.5 per cent in silicon and the remainder an iron 1.50 to 1.80 per cent silicon and 0.40 to 0.70 phosphorus. In northern New Jersey an inquiry of 2500 tons for last half shipment has come up. The New England embargoes are unchanged, except that Meriden, Conn., has been declared a free point. The lifting of the coke embargo on the New Haven road is predicted, but the Pennsylvania Railroad has made no modification of its embargo on coke that would permit shipments to New England. The Lackawanna road, however, is doing better work on deliveries of coke and pig iron. Buffalo quotations in New England generally range from \$19 to \$19.50 at furnace for No. 2X, though in the past week a quotation of considerably below \$18.50 for No. 2 plain has been reported on a round lot. We quote at tidewater as follows for early delivery: No. 1 foundry, \$20.75 to \$21.25; No. 2X, \$20.50 to \$20.75; No. 2 plain, \$20 to \$20.50; Southern iron at tidewater, \$20.75 to \$21 for No. 1 and \$20.25 to \$20.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Both spot and contract demand for ferromanganese have fallen off and the market is quieter than in many weeks. Further sales of about 300 tons in the past week for delivery in the first half of 1917 have been made at \$175, seaboard, the present quotation, but no spot material has changed hands so far as known, though some is still offered at \$400. Receipts in March are known to have been over 6800 gross tons, or nearly equal to those of February, both of which were larger than in many months. It is understood that April receipts are equally as good thus far and about 2000 tons is expected to be brought into New York in the month. Plans for domestic production of ferromanganese are reported as progressing favorably, which, together with the resumption of an eastern Pennsylvania furnace on this alloy, are favorable factors. Spiegeleisen is in strong demand and quoted at from \$60 to \$70 for last-half delivery. Ferrosilicon, 50 per cent, is very active, with specifications on contract very brisk. Most makers are booked far ahead. Demand for spot material is less active, though some has been sold at \$95 to \$100, delivered. The quotation on contract is still \$83 to \$85, Pittsburgh. An inquiry for about 4000 tons of ferrosilicon for export, with a minimum content of 85 per cent silicon, has recently appeared.

Structural Material.—Railroad work is the prominent feature of new inquiry, but the total is not large. Quite a number of structural jobs are, however, under way and, as has been true for a number of weeks, considerable secrecy is exercised regarding them. As the amount of steel available for delivery in two or three months narrows down, the price stiffens in relation to the prices on deferred shipments, and 2.50c., Pittsburgh, is apparently obtainable only in the case of the largest size orders from what are sometimes termed preferred customers, such as the car builders. The bulk of new buying is close to 2.75c., Pittsburgh, on an average, with 2.60c. as the ordinary minimum for large lots. Of the railroad offerings, mention may be made of seven bridges for the Lehigh Valley, taking 500 tons; three bridges for the New York Central, totaling 750 tons; some 450 tons, with more early expected, for the

Pennsylvania, and 650 tons for the Atlantic Coast line at Richmond, Va., the last placed with the American Bridge Company. Decisions are expected soon on 500 tons for the Maine Central and 1000 tons for the Southern. Other fabricated steel awards include 850 tons for Barnard College to the Levering & Garrigues Company; 1400 tons for the Abercrombie & Fitch loft, Madison Avenue and Forty-fourth Street, to the American Bridge Company; 500 tons to the Madison Avenue Presbyterian Church house to the Hinkle Iron Company, which has also taken 250 tons for a garage at West End Avenue and Sixty-fourth Street; 300 tons for the Cushman stable, Amsterdam Avenue, to Rues Brothers, and 600 tons for the Traylor Engineering Company, Allentown, Pa. We quote plain material at 2.759c. to 3.169c., New York, in the second quarter, with 3.10c. out of New York warehouse.

Steel Plates.—The minimum for the last part of this quarter appears now to be 3.75c., Pittsburgh, while 2.75c. is for long-deferred shipments, except to such as require plates for car-building purposes, for which some reservations seem to be made at the same price. The high prices of steel, which resulted in a number of withdrawals of inquiries for cars, appear now to have brought about a design of cars made up of as much wood as possible. This is true of 300 stock cars for the Illinois Central and 2000 cars for the Chicago & Northwestern. Some further foreign buying has taken place; the Standard Steel Car Company is to build 500 cars and parts for a number of others for the French State railways, which have also placed some cars with the Eastern Car Company, New Glasgow, N. S., and some with a Spanish company, 4000 in all. The Mobile & Ohio of the Southern system has bought on its 1000-car inquiry a total of 3250 cars, 1750 placed with the American Car & Foundry Company and 1500 with the Mount Vernon Car Mfg. Company. The American Car & Foundry Company will build 250 hopper cars for the Pittsburgh, Shawmut & Northern and the German-American Car Company 30 tank cars for the Calumet & Arizona Mining Company. The Pressed Steel Car Company has taken 55 hopper cars for the Solvay Process Company and 300 underframes for the Gadsden Car Works. We quote mill shipments in the latter part of the present quarter at 3.919c. to 4.669c., New York; in the latter part of the year at 2.919c., New York, and out of warehouse at 4c., New York.

Iron and Steel Bars.—With the rush of specifications on contracts in March, it is not surprising that specifications so far in April have not been heavy; but this fact so far is not regarded as significant of any change in the situation. The scarcity of soft steel bars is occasionally made up by offering bars rolled from cropped or unused parts of bars rolled for shell steel and running, say, from 0.35 to 0.45 per cent carbon and higher. Such bars are being offered for reinforcing purposes and also for drop-forging purposes. We quote steel bars at 2.75c. to 3c., Pittsburgh, on mill shipments; iron bars, 2.669c., New York, and iron and steel bars from warehouse at 3.10c., New York.

Cast-Iron Pipe.—An interesting inquiry is that of the city of Rochester, N. Y., which is asking for bids on 12,000 tons of 37-in., to be opened April 19. The Warren Foundry & Machine Company has been definitely awarded the contract by the city of Boston for 140 tons of high pressure pipe. All bids have been thrown out by the city of Niagara Falls on about 2400 tons to cover its requirements for this year and it will shortly re-advertise. While private buying is now mainly of small lots, this class of trade keeps up steadily. Carload lots of 6-in., class B and heavier, are quoted at \$30.50 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

Old Material.—The market has not been active the past week, although such transactions as have occurred have embraced practically all classes of old material. The tendency to dullness is attributed largely to the closing of the heavy railroad lists which came out this month. Numerous consumers have made bids on railroad offerings, and until they know the result have no disposition to open negotiations with dealers. Greater activity is looked for later in the month. Relaying rails are in heavy demand, with a limited supply. Brokers

are paying about as follows to local dealers and producers, per gross ton, New York:

No. 1 heavy melting steel scrap (railroad or equivalent).....	\$15.75 to \$16.00
Yard heavy steel (eastern Pa. specifications).....	15.25 to 15.75
Relaying rails.....	24.00 to 24.50
Re-rolling rails.....	17.25 to 17.50
Iron car axles.....	26.50 to 27.00
Steel car axles.....	27.50 to 28.00
No. 1 railroad wrought.....	21.50 to 22.00
Wrought-iron track scrap.....	19.00 to 19.50
No. 1 yard wrought, long.....	17.50 to 17.75
No. 1 yard wrought, short.....	16.50 to 16.75
Light iron.....	7.50 to 8.00
Cast borings (clean).....	9.50 to 9.75
Mixed borings and turnings.....	8.00 to 8.25
Wrought pipe.....	13.25 to 13.50
Old carwheels.....	16.00 to 16.50
Malleable cast (railroad).....	12.75 to 13.25

Foundries are steady buyers of cast scrap, although quantities are seldom large. Quotations to consumers are as follows, per gross ton, New York:

No. 1 cast (machinery).....	\$18.00 to \$18.50
No. 2 cast (heavy).....	16.50 to 17.00
Stove plate.....	12.00 to 12.50
Locomotive grate bars.....	12.00 to 12.50

Buffalo

BUFFALO, N. Y., April 11, 1916.

Pig Iron.—The market has been quiet and the total of orders placed small. Inquiry is before the market, however, for from 25,000 to 30,000 tons of various grades, including a little malleable, comprising several lots of 4000 tons and over and one of 8000 tons. A small amount is for delivery beyond the end of the year, although furnaces are not encouraging bookings of 1917 business now. Prices are strong and firmly held, but not quotably higher. If the present conditions prevail for another week, however, advances in the price schedule are likely to occur. We quote, f.o.b. furnace, Buffalo, for current and last half delivery.

No. 1 foundry.....	\$19.50 to \$20.00
No. 2 X foundry.....	19.00 to 19.50
No. 2 plain.....	18.75 to 19.00
No. 3 foundry.....	18.75 to 19.00
Gray forge.....	18.50 to 19.00
Malleable.....	19.00 to 20.00
Basic.....	19.00 to 20.00
Bessemer.....	21.00 to 22.00

Finished Iron and Steel.—The feature is the strong demand for reinforcing bars, either spiral twisted or deforms, being heavier in this territory now than for any other steel product. One or two large manufacturing concerns are seriously considering the advisability of placing orders for such bars for shipment at mills' convenience, in order to accumulate a stock before starting construction work on plant extensions contemplated later, carrying the stock and supplying the material to contractor as needed. Most agencies and producers are discriminating sharply against increasing their obligations in bars, shapes and plates, and some state they are accepting no new tonnage whatever. There have been some specific orders placed during the week, however, for shipment at mills' convenience over the fourth quarter, these taking the place of the usual blanket contracts. Cold rolled steel has been advanced by one prominent producer to 15 per cent off for carload lots and 10 per cent for less than carloads. The minimum of other sellers seems to be 20 per cent off—with more tonnage offered than mills are willing to take. Jobbers are asking 10 per cent beyond the list on lots of 500 lb. or over, and 15 per cent more than list for lots under 500 lb. Prices have been advanced for washers and railroad and boat spikes. Warehouse prices on bars, shapes and plates remain unchanged. The Lackawanna Bridge Company, Buffalo, has taken 200 tons for a power house for the Defiance Paper Company, Niagara Falls. The Ferguson Steel & Iron Company, Buffalo, has taken 1000 tons for the new by-product coking plant of the Semet-Solvay Company on the Niagara River, Buffalo.

Old Material.—Generally the market is quiet, with a trend which, if kept up, will result in the softening of prices. But no changes have taken place yet. Turnings and borings, however, exhibit an exception, owing to the demand from the Pittsburgh district. Some

furnaces there have come into the market for turnings and borings to mix with their ore in making pig iron, being forced to do this because of the shortage of iron ore on hand and the prospect of a delay in getting it down the lakes owing to the unusually heavy ice conditions. This is having the effect of materially stiffening prices of these two commodities. We quote dealers' asking prices per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel.....	\$18.00 to \$18.50
Low phosphorus steel.....	21.00 to 21.50
No. 1 railroad wrought scrap.....	19.00 to 19.50
No. 1 railroad and machinery cast scrap.....	16.00 to 16.50
Old steel axles.....	24.00 to 24.50
Old iron axles.....	24.00 to 24.50
Old carwheels.....	15.25 to 15.75
Railroad malleable.....	16.00 to 16.50
Machine shop turnings.....	8.50 to 9.00
Heavy axle turnings.....	12.50 to 13.00
Clean cast borings.....	9.25 to 9.75
Old iron rails.....	18.00 to 18.50
Locomotive grate bars.....	12.00 to 12.50
Stove plate (net ton).....	11.50 to 12.00
Wrought pipe.....	14.00 to 14.50
Bundled sheet scrap.....	13.00 to 13.50
No. 1 busheling.....	15.00 to 15.50
No. 2 busheling.....	12.00 to 12.50
Bundled tin scrap.....	15.00 to 15.50

British Steel Market

American Steel Scarce—Sales of Ferromanganese for Delivery in 1917

(By Cable)

LONDON, ENGLAND, April 12, 1916.

The pig-iron market is firm with a growing scarcity. Hematite iron is unchanged, but ore freights are weaker. Tin plates are 32s. 6d., with good export inquiries. Very little American steel is obtainable. The United States has bought 10,000 tons of ferromanganese at \$175, c.i.f., for shipment the first half of next year. Quotations, partly nominal, of some materials are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 32s. 6d., against 32s. last week.
 Cleveland pig-iron warrants, 86s. 6d.
 Steel black sheets, No. 28, export f.o.b. Liverpool, £19 15s.
 Steel ship plates, Scotch, delivered local yards, £13 10s.
 Steel rails, export, f.o.b. works, port, £11.
 Hematite pig iron, f.o.b. Tees, about 139s.
 Sheet bars (Welsh) delivered at works in Swansea Valley, £13 10s.
 Steel bars, export, f.o.b. Clyde, £18 5s., compared with £13 a week ago.
 Ferromanganese, £35, nominal.
 Ferrosilicon, 50 per cent, c.i.f., £27.

April Orders for Locomotives Large

Orders for 83 locomotives were placed the first week in April with inquiries for 29. The Baldwin Locomotive Works will build 26 Mikado and 6 Mallet locomotives for the Philadelphia & Reading, 20 for the St. Louis & South Western, 10 Pacifics for the St. Louis & San Francisco, 7 Santa Fes and 3 Pacifics for the Chicago & Great Western and 4 switching locomotives for the Minneapolis & St. Louis, in addition to 6 ordered a week ago. A feature of the orders that have been placed this year is the large number of contracts for one or two locomotives for industrial companies. The Wabash is inquiring for 25 Santa Fe locomotives.

The Bock Bearing Company, Toledo, Ohio, has been reorganized with an increase in capital stock to \$1,650,000 and will enlarge its plant to more than double its present capacity. The bulk of its product of steel bearings is used by the automobile trade. W. E. Bock is president of the reorganized company, Eugene Rheinfrank vice-president and C. H. Clement secretary and treasurer.

The recent Susquehanna River flood caused the Central Iron & Steel Company, Harrisburg, Pa., to close its open-hearth department and subsequently lessen operations over its entire plant. The interruption to activity, though temporary, was costly as well as vexatious, with deliveries due on large orders.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast, 65c. on plates, structural shapes, iron and steel bars, pipe and boiler tubes, tin plate, nails, spikes and wire. The foregoing rates to the Pacific coast are by rail only, the Panama Canal still being closed.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.30 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 2.75c. to 3.75c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3/16 in. take the price of 3/16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

	Cents per lb.
Extras	
Gages under ¼ in. to and including 3/16 in.	.10
Gages under 3/16 in. to and including No. 8	.15
Gages under No. 8 to and including No. 9	.25
Gages under No. 9 to and including No. 10	.30
Gages under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths under 1 ft.	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Rods.—Bessemer, open-hearth and chain rods, \$60, nominally.

Wire Products.—Prices to jobbers, effective Feb. 29: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.25; galvanized, \$2.95. Galvanized barb wire and staples, \$3.25; painted, \$2.55. Wire nails, \$2.40. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Nos.	0 to 9	10	11	12	12½	13	14	15	16
Annealed	\$2.30	\$2.35	\$2.40	\$2.45	\$2.50	\$2.55	\$2.60	\$2.65	\$2.70
Galvanized	3.20	3.25	3.30	3.35	3.40	3.55	3.60	3.65	3.70

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from March 29, 1916, on black and galvanized steel and iron pipe, all full weight:

Steel		Butt Weld		Iron	
Inches	Black	Galv.	Inches	Black	Galv.
½, ¾ and 1	65	33½	½ and ¾	54	28
1½	69	49½	1	55	28
¾ to 3	72	53½	1½	59	36
			¾ to 1½	63	41

Lap Weld		Reamed and Drifted	
Inches	Black	Inches	Black
1½ to 6	68	1½	51
1½ to 6	71	1½	57
7 to 12	67	2	58
13 and 14	58½	2½ to 4	60
15	56	4½ to 6	60
		7 to 12	58

Butt Weld, extra strong, plain ends		Lap Weld, extra strong, plain ends	
½, ¾ and 1	61	1½	53
1½	66	1½	58
¾ to 1½	70	2	60
2 to 3	71	2½ to 4	62
		4½ to 6	61
		7 to 8	54
		9 to 12	49

Butt Weld, double extra strong, plain ends		Lap Weld, double extra strong, plain ends	
½	57	1½	47
¾ to 1½	60	1½	47
2 to 2½	62	2½ to 4	49
		4½ to 6	48

Blue Annealed Sheets		Box Annealed Sheets, Cold Rolled	
Nos. 3 to 8	2.45 to 2.95	Nos. 17 to 21	2.65 to 2.70
Nos. 9 to 10	2.90 to 3.00	Nos. 22 and 24	2.70 to 2.75
Nos. 11 and 12	2.95 to 3.05	Nos. 25 and 26	2.75 to 2.80
Nos. 13 and 14	3.00 to 3.10	No. 27	2.80 to 2.85
Nos. 15 and 16	3.10 to 3.20	No. 28	2.85 to 2.90
		No. 29	2.90 to 2.95
		No. 30	3.10 to 3.15

Galvanized Sheets of Black Sheet Gage		Standard Charcoal Iron	
Nos. 10 and 11	4.00 to 4.35	1½ in.	37 to 38
No. 12	4.10 to 4.35	1½ and 2 in.	41 to 42
Nos. 13 and 14	4.10 to 4.35	2½ in.	38 to 39
Nos. 15 and 16	4.20 to 4.45	2½ and 2¾ in.	45 to 46
Nos. 17 to 21	4.35 to 4.60	3 and 3½ in.	49 to 50
Nos. 22 and 24	4.55 to 4.80	3½ to 4½ in.	51 to 52
Nos. 25 and 26	4.70 to 4.95	5 and 6 in.	45 to 46
No. 27	4.85 to 5.10		
No. 28	5.00 to 5.25		
No. 29	5.15 to 5.40		

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes, in effect from March 29, 1916, and standard charcoal-iron tubes, effective from Feb. 29, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1½ in.	39	1½ in.	37 to 38
1½ and 2 in.	51	1½ and 2 in.	41 to 42
2½ in.	48	2½ in.	38 to 39
2½ and 2¾ in.	54	2½ and 2¾ in.	45 to 46
3 and 3½ in.	59	3 and 3½ in.	49 to 50
3½ to 4½ in.	60	3½ to 4½ in.	51 to 52
5 and 6 in.	53	5 and 6 in.	45 to 46
7 to 12 in.	50		

Locomotive and steamship special charcoal grades bring higher prices.

1½ in. over 18 ft. and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery							
	Copper, New York	Tin, New York	Lead, New York		Spelter, New York		
April	Lake	Electro-lytic	New York	St. Louis	New York	St. Louis	
5.....	27.50	27.37½	53.00	8.00	8.00	18.25	18.00
6.....	27.50	27.37½	53.00	7.87½	7.87½	18.37½	18.12½
7.....	27.50	27.37½	53.00	7.87½	7.87½	18.62½	18.37½
8.....	27.50	27.37½	53.00	7.87½	7.87½	18.75	18.50
9.....	27.50	27.37½	53.00	7.87½	7.87½	18.87½	18.62½
10.....	27.50	27.37½	53.00	7.87½	7.87½	19.00	18.75
11.....	27.50	27.37½	53.00	7.87½	7.87½	19.00	18.75
12.....	28.00	27.75	53.00	7.87½	7.87½	19.00	18.75

NEW YORK, April 12, 1916.

Copper has been active on both foreign and domestic account and prices have advanced. Tin is higher, following some heavy buying. Lead is dull and easier. Spelter has been moderately active and prices are stronger. Spot antimony is lower for the reason that more is available.

New York

Copper.—Following the great activity of the early part of last week, when foreign governments took many millions of pounds, the market became quiet, although prices remained firm. There was some spasmodic business but not enough to create any excitement. On Friday the London market for electrolytic eased off to £134 where it stands to-day. On Monday the activity started again on a large scale, domestic as well as foreign buyers coming into the market. The result was that some of the leading sellers advanced their price for electrolytic to 28c., full terms, for July and August delivery. Yesterday the heavy business continued and 27.75c., cash, New York, was the lowest figure at which electrolytic was available, while some sellers quoted 28c. Lake was strong at 29c., future delivery. At the close of the day 28c., 30 days, delivered, was the lowest price obtainable in electrolytic. Nearby electrolytic would bring 29c. at least. It is estimated that in the recent buying Great Britain and France took upward of 200,000,000 lb., and further buying for export to Russia and Italy is expected. The exports this month, up to and including yesterday, total 7017 tons.

Tin.—In the latter part of last week the market was decidedly active. Considerable excitement was caused April 5 when a broker on the New York Metal Exchange bid 55c. for April tin. A few consumers who were bare of stocks bought at that figure, but not much was done at the bid price, and the market closed at 53c. The incident created a good demand for other positions and probably 300 tons changed hands. On the following day spot was obtainable in limited quantities at 53c. and about 150 tons of various positions was taken. There was good inquiry for tin afloat and futures, April 7, and a big business was done, one buyer alone taking 300 tons. This week the market has been dull and some eagerness to sell spot and April has become apparent. The quotation for spot yesterday was 53c. The arrivals this month total 675 tons and there is afloat 5389 tons.

Lead.—Domestic consumers are holding back in buying. They are not carrying large stocks, and are waiting for a lower market. The leading interest continues to quote 7.50c., New York, and 7.42½c., St. Louis, but is using these quotations only as a means of establishing an average price. Throughout the week some of the independents adhered to 8c. at both New York and St. Louis, but the metal could be had under that level. There have been reports that 7.75c., New York, could be done, but it cannot be learned that business was taken at this figure. Some large inquiries from foreign countries have been before the trade, and 8.25c. has been quoted, but orders have not been placed. The average quotation yesterday was 7.87½c. at both New York and St. Louis. The exports this month, up to and including yesterday, totaled only 155 tons.

Spelter.—Under activity which has been moderately good, the market has advanced steadily. Prompt spelter was quoted yesterday at about 19c., New York, and 18.75c., St. Louis, and April at about the same level. May delivery is quoted at 18c., St. Louis, and June

at 17.75c. Third quarter ranges from 16.25c. to 16.50c., St. Louis. The brass mills have been buying freely but prices are getting too high for the galvanizers. The exports this month, up to and including yesterday, total 1015 tons.

Antimony.—Spot antimony is easier at 43c. The available stock has been increased considerably, although there is some difficulty in getting it because of the local congestion of freight. Several cars which are near at hand are tied up for this reason, but their release is expected daily.

Aluminum.—The market is quiet, with a nominal quotation for No. 1 virgin aluminum, '98 to 99 per cent pure, unchanged at 59c. to 61c.

Old Metals.—Firmness now rules the market. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	25.00 to 26.00
Copper, heavy and wire.....	24.00 to 25.00
Copper, light and bottoms.....	20.00 to 21.00
Brass, heavy.....	15.00 to 15.50
Brass, light.....	12.50 to 13.00
Heavy machine composition.....	18.00 to 19.00
No. 1 yellow rod brass turnings.....	16.00 to 16.50
No. 1 red brass or composition turnings.....	16.00 to 17.00
Lead, heavy.....	5.75
Lead, tear.....	5.25
Zinc.....	14.00 to 15.00

Chicago

APRIL 10.—With large sales abroad and a strong domestic inquiry, the copper market holds strong with higher prices. A sharp advance in tin is noted as well as a continued upward tendency for spelter. Lead is weaker. We quote: Casting copper, 27c.; Lake copper, 28.50c.; tin, carloads, 55.50c., and small lots, 57.50c.; lead, 7.75c.; spelter, 18.50c. to 18.75c.; sheet zinc, 25c.; Cookson's antimony, 50c.; other grades, 44c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 22c.; copper bottoms, 20c.; copper clips, 21c.; red brass, 18c.; yellow brass, 14c.; lead pipe, 6c.; zinc, 13.50c.; pewter, No. 1, 28c.; tinfoil, 38c.; block tin pipe, 44c.

St. Louis

APRIL 10.—Non-ferrous metals are firm and fairly active. Quotations to-day are as follows: Lead, 8.25c.; spelter, 20c.; tin, 58c.; Lake copper, 28.50c.; electrolytic copper, 28.25c.; Asiatic antimony, 50c. In the Joplin ore district zinc blende was about \$5 per ton higher, the range for ore, 60 per cent, being \$100 to \$120 per ton, with top settlements reaching \$125 on premium grade and the average for the week's production \$106. Calamine was stronger at \$75 to \$90 for 40 per cent, with an average for the week of \$82. Lead ore advanced \$2.50 to \$102.50 for 80 per cent and the average for the week was \$101. For miscellaneous scrap metals we quote dealers' buying prices as follows: Zinc, 12c.; lead, 5.50c. to 6c.; tea lead, 3.50c.; light brass, 10.50c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 16c.; heavy copper and copper wire, 20c.; pewter, 24c.; tinfoil, 33c.

The Canadian Minister of Trade and Commerce, Sir George Foster, in an address before the Toronto Board of Trade, made the announcement that he will establish, probably at Ottawa, a commercial museum, to afford practical ideas to those contemplating the launching of new industries in Canada. Samples of products of other nations, with a history of each, will be shown, the idea being to enable prospective manufacturers to investigate and decide whether such articles could be successfully manufactured in Canada.

Pearson, Peppard & Co. have opened offices in the Woolworth Building, New York, to conduct a general business in brass and copper rolling-mill products, steel and steel products. Mr. Pearson and Mr. Peppard have been closely associated with the metal business for several years, both in mill products and virgin metals, such as tin, copper, lead, spelter, antimony, aluminum, etc. Mr. Pearson was with Bruce & Cook several years and latterly with the North American Copper Company, New York.

Iron and Industrial Stocks

NEW YORK, April 12, 1916.

On Wednesday of last week the stock market receded slightly and then steadily advanced until Friday, when a sharp break occurred caused by a rumor that the United States had severed diplomatic relations with Germany. Since that time prices of securities have recovered much of the ground lost. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal. com., 28% - 30	Republic, com., 50 1/2 - 51 1/2
Allis-Chal. pref., 76% - 77%	Republic, pref., 108% - 109
Am. Can. com., 59% - 61%	Sloss, com., 54 - 56
Am. Can. pref., 111% - 112	Pipe, com., 21 - 22
Am. Car & Fdy., com., 67% - 70%	Pipe, pref., 51 1/4 - 51 3/4
Am. Car & Fdy., pref., 116% - 116 3/4	U. S. Steel, com., 83 3/4 - 85 1/4
Am. Loco. com., 76 - 80 1/2	U. S. Steel, pref., 116 1/4 - 117 1/4
Am. Loco. pref., 102 - 102 1/2	Westg. Electric, 63% - 66 1/4
Am. Steel Fdries, 51% - 52%	Am. Rad., com., 39 1/2 - 39 3/4
Bald. Loco. com., 105 1/4 - 108 3/4	Am. Rad., pref., 134 - 135
Bald. Loco. pref., 105 1/4 - 108 3/4	Am. Ship, com., 45% - 46%
Beth. Steel, com., 461 - 485	Am. Ship, pref., 89 - 90
Beth. Steel, pref., 135	Chic. Pneu. Tool, 72 - 73 1/4
Case (J. I.), pref., 88	Cambria Steel, 81 1/4
Colorado Fuel, 43% - 46	Lake Sup. Corp., 10 1/4 - 10 1/2
Duere & Co., pref., 94% - 94 1/2	Pa. Steel, com., 80
Gen. Electric, 165 1/4 - 168	Pa. Steel, pref., 98
Gr. No. Ore Cert., 43 - 44 1/2	Warwick, 10 - 10 1/2
Int. Harv. of N. J., com., 110% - 112 1/2	Cruc. Steel, com., 89 1/4 - 95 1/4
Int. Harv. of N. J., pref., 119%	Cruc. Steel, pref., 116 1/4 - 116 3/4
Int. Harv. Corp., com., 72	Harb-Walk. Refrac., com., 84
Lacka. Steel, 75% - 77%	Harb-Walk. Refrac., pref., 103
Nat. En. & Stm., com., 24 1/4 - 25%	La Belle Iron, com., 54 - 55 1/2
N. Y. Air Brake, 142 1/4 - 147	La Belle Iron, pref., 128
Pitts. Steel, pref., 99 - 99 1/4	Am. Brit. Mfg., com., 22 - 24
Pressed Stl. com., 51 1/4 - 53 1/2	Am. Brit. Mfg., pref., 60 - 68
Pressed Stl. pref., 102 1/4 - 103	Carbon Stl. com., 73 - 77
Ry. Stl. Spring, com., 39 - 39 1/2	Central Fdry. com., 12
Ry. Stl. Spring, pref., 95% - 96	Diezgs-Seabury, 136 - 140
	Midvale Steel, 64 1/2 - 66%

Dividends

The Harbison-Walker Refractories Company, regular quarterly, 1 1/2 per cent on the preferred stock, payable April 20.

The Eastern Steel Company, 7 per cent on account of back dividends on the first preferred stock, payable May 15.

The General Motors Company, regular quarterly, 5 per cent on the common stock and 3 1/2 per cent on the preferred stock, payable May 1.

The Ingersoll-Rand Company, 20 per cent extra on the common stock, and 30 per cent on the common stock, payable in common stock, both payable April 29.

Midwestern Classification of Building Material

The Midwestern Structural Steel Association, whose membership covers Iowa, western Illinois, eastern Nebraska and northern Missouri, at a meeting held March 8, adopted a classification of iron and steel with a recommendation that architects, contractors, builders, etc., use it in their specifications for buildings. It effects a separation of these products under the heads of structural steel and iron; ornamental steel and iron; reinforcing material; miscellaneous steel and iron.

Under the head of structural steel and iron are enumerated angles, beams, bearing plates, channels, cast-iron columns, field bolts or rivets for steel and iron, fire escapes, gas-pipe columns, marquee (frame only), plate girders, rods for trusses, separators, steel columns, shoes for trusses, trusses and tie rods.

Under ornamental steel and iron are enumerated brass rail, brass thresholds, brass sliding pole, elevator inclosures, grill work, nosing for stairs, ornamental inside stairs, outside steel and iron stairs, ornamental lamps for exterior, spiral stairs, spiral slides, steel fence and wall registers.

Under miscellaneous steel and iron are given ash hoists, ash dumps, area gratings, bolts for wood to wood, bolts for wood to steel, bolts for wood to masonry, cast-iron rain-water receivers, cast-iron down-spout shoes, coal chutes, cleanouts, coal rings and covers, cast-iron chimney caps, cast-iron thresholds, curb angles, door jambs and sills, fireplace dampers, flag poles, frames for toilet partitions, frames for shower partitions, fire-door frames, gas pipe railing, hog chains, joist anchors and hangers, ladders, post caps and bases, partition bolts, rolling steel doors, sidewalk

lights, sidewalk doors, smoke stacks, steel partitions, wheel guards, wall plate anchors and window guards.

The secretary and treasurer of the association is George W. Newell, Des Moines, Ia.

Pacific Coast Interior Rates Not Raised

WASHINGTON, D. C., April 11, 1916.—The Interstate Commerce Commission has ordered the cancellation of schedules which were recently suspended until May 12, 1916, and which proposed a 33 1/3 per cent increase in the rates on structural iron and steel and other articles from north Pacific coast terminals to Spokane, Wash., and other points in the same general territory. The action of the commission affects, directly or indirectly, all shipments to this region from points east of Chicago.

Following the opening of the Panama Canal in August, 1914, the transcontinental rail carriers, confronted apparently with a shrinkage of business to the Pacific coast by reason of the competition of boat lines, obtained authority from the commission to reduce their rates on many commodities from Eastern territories to the Pacific coast and intermediate points. On the basis of the commission's report rates were fixed to Pacific coast terminals, and to permit the coast fabricators to continue to compete at Spokane and other points in that region with Eastern fabricators, a commodity rate of 30c. per 100 lb. was established on structural iron and steel from the coast to Spokane. For the purpose, as the carriers assert, of protecting their revenues through an endeavor to hold a larger percentage of the traffic to the all-rail routes to Spokane and of establishing "a more defensible relation between the rates on analogous iron articles" they have sought in the schedules under suspension to increase the rates from the coast to Spokane points on structural iron and steel from 30c. to 40c.

W. L. C.

Russian Iron and Steel in 1915

Russia's pig-iron production in 1915 is estimated at 3,696,560 metric tons, or 564,448 tons less than that of 1914 and 851,816 tons less than that of 1913, according to a recent bulletin issued by the central committee of industrial mobilization of Petrograd, Russia. Leaving out the district of Poland and considering only South Russia, the Urals and the central district, the 1915 output was 3,648,344 tons against 4,003,534 tons in 1914 and 4,135,324 tons in 1913.

Out of a total consumption of 4,741,240 tons of pig iron in 1913 the bulletin states that 4,548,376 tons, or 96 per cent, was made in Russia. A diminution of imports late in 1914 did not cause anxiety, but later, owing to the comparative shortage of materials, the government decided to procure, principally from the United States, 321,000 tons of rails, 80,000 tons of wire and 105,000 tons of axles, tires, etc.

The output of semi-finished steel in 1915 is put at 4,018,000 tons against 4,243,008 tons in 1913 and of manufactured iron and steel at 3,214,400 tons against 3,535,840 tons in 1913.

The pig-iron production could have been raised to 4,500,000 tons if deliveries of raw materials could have been made to 15 blast furnaces out of service in South Russia.

Exports and Imports of Non-Ferrous Metals in 1915

Imports and exports of non-ferrous metals for 1915, according to the official returns of the United States Department of Commerce, were as follows, in gross tons:

	Exports	Imports
Copper, as pigs, ingots and bars	304,443	
Copper, metallic		89,896
Tin, metallic		51,622
Lead, as base bullion, pigs, bars, etc.	112,092	37,859
Zinc, metallic	121,346	847

In 1914 the exports of zinc were 57,899 tons and only 6957 tons in 1913. The valuation of the 1915 zinc exports was \$31,222,295, or \$280 per ton, against \$955,667 for the 1913 exports, or \$13 per ton.

PERSONAL

Richard Brinsley Sheridan, general manager of the Brown Hoisting Machinery Company, Cleveland, Ohio, has resigned that position to become one of the executives of the American International Corporation, which recently purchased the Allied Machinery Company of America. Mr. Sheridan has charge of the Allied Machinery Company which has offices in conjunction with those of the corporation on the thirty-seventh floor of the Equitable Building, 120 Broadway, New York. It is expected that he will be elected president of the Machinery Company. This company has heretofore confined its activities mostly to selling machine tools in Europe, where it has several branch offices, as well as a showroom in Paris. It is believed that under his management the company will extend its operations to other mechanical lines. The American International Corporation has lately taken a \$5,000,000 contract with the government of Uruguay for the construction of sewage and waterworks systems in three cities of that country. Mr. Sheridan assumed his new post April 1.

Archibald Johnston, vice-president Bethlehem Steel Company, a graduate of the class of '89 of Lehigh University, was given a dinner April 7 at the Machinery Club, New York, by the members of the New York Lehigh Club. Many prominent steel manufacturers were among the 250 persons present.

Clyde M. Carr, president Joseph T. Ryerson & Son, New York, Chicago and St. Louis, is sojourning in Santa Barbara, Cal. He will return to Chicago early in May.

Clarence K. Prince has been appointed general superintendent of the manufacturing department of the H. B. Smith Company, Westfield, Mass. He will retain also his duties as purchasing agent. Mr. Prince was graduated from Worcester Polytechnic Institute in 1890 and became assistant superintendent of the Main Street plant. Later he was superintendent of the North Side plant and about 20 years ago was made purchasing agent.

Richard D. Murphy, Worcester, Mass., some years ago president of the Worcester Mfg. Company, has been made employment manager of the Worcester plant of the Wyman-Gordon Company. This is a new office and the duties, besides the selection of workmen, will include supervision of most of the industrial relations of the company and its employees.

R. E. Bebb, Canton, Ohio, has been elected general manager of the Massillon Rolling Mill Company, Massillon, Ohio, to succeed J. M. Jones, who recently resigned to become president of the Baltimore Sheet & Tin Plate Company. Mr. Bebb has been president of the company for some time and is also president of the Canton Stamping & Enameling Company and was recently elected president and general manager of the Central Steel Company, Massillon, to succeed J. C. Neale, the present general sales manager of the Cambria Steel Company.

A. C. Brown has been elected general manager of the Brown Hoisting Machinery Company, Cleveland, Ohio, succeeding R. B. Sheridan, who has resigned to accept a position with the American International Corporation, New York City. Mr. Brown is also vice-president of the Brown Hoisting Machinery Company, and has been assistant manager.

N. B. Ford, who for a number of years has represented the Corbin Screw division of the American Hardware Corporation in the Kansas City district, is now associated with the Ford Chain Block & Mfg. Company, Philadelphia. He will cover the territory from Philadelphia to Boston.

George D. Evans, formerly assistant purchasing agent for the Inland Steel Company, at Indiana Harbor, Ind., has been appointed purchasing agent for the Central Steel Company, Massillon Ohio. He is succeeded in

his former capacity by J. E. Stafford, formerly assistant works auditor.

Charles C. Wright, manager of the steel tubing department of the Cleveland Tool & Supply Company, Cleveland, Ohio, has been elected secretary of the company. He will continue to have charge of the tubing department, which acts as distributor for the seamless steel tubing manufactured by the National Tube Company.

H. S. Anderson, formerly with the American Locomotive Company, has become connected with the Poole Engineering & Machine Company, Woodberry Md., as general manager. G. S. Bartlett, formerly of Richmond, has been made ordnance expert and equipment man.

Thomas C. Clarke, who until March 1 was president of the Industrial Service Corporation, New York, has opened an office as consulting and supervising engineer at 111 Broadway, specializing in by-product coke ovens and their products.

W. M. McNeilage, managing director of the Australian Glass Mfg. Company, Melbourne and Adelaide, spent most of the past week in St. Louis, buying machinery and studying manufacturing methods in plants in and near the city.

W. C. Hamilton, chief chemist, American Steel Foundries, East St. Louis, Ill., addressed the St. Louis section of the American Chemical Society April 5 on "Modern Methods in the Manufacture of Steel Castings." The section visited the plant April 4.

Ernest Humbert, formerly associated with the late Dr. Heroult, inventor of the Heroult electric steel furnace, from the time he made the first heat of steel in France, is now a consulting engineer in Welland, Ontario, Canada, specializing in electric furnace work.

Bradley Stoughton, secretary American Institute of Mining Engineers and president of the Stoughton Process Corporation, New York, addressed the Philadelphia Foundrymen's Association on Wednesday evening, April 5, on "Melting with Crude Oil in the Cupola."

C. Herbert Halcomb, formerly a director and works manager of the International High Speed Steel Company, and William P. Davidson, for 11 years vice-president and general manager of the company, have withdrawn from it and formed Halcomb & Davidson, Inc., with offices in the Singer Building, New York. The new company will engage in the manufacture and sale of tool, high speed, alloy and drill steels, solid and hollow.

H. M. Deemer, secretary of the Midvale Steel Company, has also been made secretary of the Worth Brothers Company.

W. S. Rutherford, for 15 years manager of the order department at the Steelton plant of the Pennsylvania Steel Company, has been chosen to head the order department of the Bethlehem Steel Company and all its subsidiaries, now being organized. He will assume his new duties about June 1 and his headquarters will be at South Bethlehem, Pa.

Frederick P. Nehrbaas has resigned as factory manager of the Lyons Atlas Company, Indianapolis, Ind., to accept the position of production manager with the Premier Motor Corporation, also of that city.

Daniel M. Rugg, formerly superintendent of the Chattanooga Gas & Coal Products Company, Chattanooga, Tenn., has become associated with the Gas Machinery Company, Cleveland, Ohio.

W. D. Smyth, district sales manager of the Cambria Steel Company, Cleveland, Ohio, has also been appointed manager of sales for the Cleveland territory of the Midvale Steel Company and the Worth Brothers Company. The three separate offices now maintained by these companies will be combined June 1 in new offices in the Sweatland Building.

W. N. Sawyer, president and general manager of the Wellman-Seaver-Morgan Company, Cleveland, Ohio, has returned from a trip to the South, where he had spent some time while recovering from a very severe attack

of typhoid fever. His condition has improved materially, so that now he is able to devote a portion of his time to his business.

Henry D. Hibbard, High Bridge, N. J., returned last week from a stay of several months in Australia on professional business.

P. J. Krentz has been appointed works manager of the Buffalo Foundry & Machine Company, Buffalo. He was formerly superintendent of the company's foundry.

Dr. Raymond F. Bacon, director of the Mellon Institute of Industrial Research of the University of Pittsburgh, has been appointed an associate member of the Naval Consulting Board and a director of the board of the organization for industrial preparedness in the State of Pennsylvania. Dr. Bacon has also been notified by Dr. Charles H. Herty, president American Chemical Society, that he is to have charge of the chemical preparedness in Pennsylvania.

W. A. Thomas, president Brier Hill Steel Company, Youngstown, Ohio, has returned from a vacation spent at White Sulphur Springs, Va.

L. B. Snow, formerly in the sales department of the St. Louis offices of the Carnegie Steel Company, Illinois Steel Company and Tennessee Coal, Iron & Railroad Company, is now connected with the Pittsburgh office of Hickman, Williams & Co., dealers in pig iron, coke, steel and alloys.

J. W. Deetrick, general manager of the Republic Iron & Steel Company, Youngstown, Ohio, is in the South inspecting the Alabama properties of the company.

J. E. M'Lain, Pittsburgh district sales manager of the Cambria Steel Company, has also been appointed manager of sales in that district for the Worth Brothers Company and the Midvale Steel Company, with offices in room 1812 Oliver Building.

Nelson E. Frissell, civil engineer and sand expert, has taken over the sand business of the Gardner General Foundry, Gardner, Mass., and will supply tested core sand to the foundry trade. The business will be carried on under the name of the Frissell Engineering & Contracting Company. Periodic analyses of the sand will be made to keep the output uniform.

Edward Blake, formerly of the J. T. Slocumb Company, Providence, R. I., is now connected with the New York staff of the Allied Machinery Company of America.

J. L. Houghton, who has been connected with the United States Malleable Iron Company, Toledo, Ohio, for the past ten years as assistant treasurer and production manager, has resigned with the expectation, it is understood, of again identifying himself with the foundry business. Over a period of 25 years he has served with the National Malleable Castings Company, Toledo, the Michigan Malleable Iron Company, Detroit, and the Grand Rapids Malleable Iron Company, Grand Rapids, Mich. On leaving the United States Malleable Iron Company on March 31, about thirty of his associates presented him with a loving cup. He still retains his position of secretary and treasurer of the Superior Iron & Mfg. Company, though not actively engaged in the management.

Technological Paper No. 59, of the United States Bureau of Standards, on "Standard Test Specimens of Zinc Bronze," is divided into two parts: Preparation of Specifications and Microstructure, by C. P. Karr, associate physicist, and Henry S. Rawdon, assistant physicist, respectively. The first part presents some valuable conclusions and the second part is enhanced in value by a very fine display of photomicrographs.

The committee on agriculture of the Massachusetts Legislature has favorably reported a bill appropriating \$383,000 for new buildings at Amherst Agricultural College, including \$30,000 to complete the boiler house and \$12,000 for engineering shops.

OBITUARY

JOHN P. K. MILLER, chief engineer of the H. C. Frick Coke Company, died at his home in Scottdale, Pa., April 8, after a year's illness, from heart trouble, aged 59 years. He was born in Martinsburg, W. Va., and went to Pittsburgh when a young man, engaging in engineering. About 30 years ago he went to Scottdale to become chief engineer for the McClure Coke Company. When that company was merged with the Frick Company, Mr. Miller was retained. He was a member of the American Institute of Mining Engineers and of the North of England Institute. He leaves his widow and five sons.

HENRY F. NIEDRINGHAUS, of the National Enameling & Stamping Company, St. Louis, died April 6, from heart disease, aged 66 years. He had recently returned from a trip to Texas for his health. He leaves his widow and several children. He was born in Westphalia, Germany, and came to the United States when 8 years old. His entire business career had been with the company with which he was connected at the time of his death. Frederick G. Niedringhaus, chairman of the board of directors, and George W. Niedringhaus, vice-president of the company, are his brothers.

LOUIS B. FULTON, president Chaplin-Fulton Mfg. Company, Pittsburgh, died at his home in that city April 8, aged 75 years. He was credited with being one of the early inventors of gas and steam regulators, and his company is one of the oldest manufacturers of these products in the country. He was a member of the Engineers Society of Western Pennsylvania and several clubs. He leaves his widow and one daughter.

DAVID THOMPSON, managing director of Thompson & Co., Castlemaine, Victoria, Australia, manufacturers of mining and general machinery, died Feb. 6, as the result of an accident in the works. He was born in 1865 and began his career in the business which was founded by his father and which is now regarded as the largest privately owned establishment of its kind in Australia.

SAMUEL W. GROOME, a retired iron commission merchant, whose offices until recently were at Third and Walnut streets, Philadelphia, died April 8 from heart disease, aged 81 years, at the home of a son at Memphis, Tenn. He leaves five sons and a daughter. Major John C. Groome, head of the Pennsylvania State Constabulary, is one of his sons.

JAMES J. McDONALD, long associated with the engineering department of the Worden-Allen Company, Milwaukee, died suddenly from heart disease at Rochester, Wis., April 4, aged 49 years. He was a native of Rochester. For seven years he had been contracting engineer in charge of the highway bridge department.

THOMAS W. WEAVER, manager of the purchasing department, Power & Mining Machinery Company, Cudahy, Wis., died at his home in Milwaukee April 1 from pleuro-pneumonia, aged 37 years. He was born in Milwaukee and for 17 years had been connected with large machinery interests of the Middle West.

GEORGE A. WILLIAMS, a retired wire goods manufacturer, died April 5, aged 84 years, at the home of his daughter in Brooklyn, N. Y. For many years he conducted the Globe Iron Works, Fulton Street, New York. He leaves two sons and a daughter.

ALICE FRENCH HINKLEY WILLIAMS, wife of David Williams, former proprietor and publisher of THE IRON AGE, died April 11 at the Hahnemann Hospital, New York City, after a prolonged illness, aged 63 years.

"Heat Transmission Through Boiler Tubes" is the title of Technical Paper 114, by Henry Kriesinger and J. F. Barkley, published by the United States Bureau of Mines. It presents the results of a study of the transmission of heat through the metal of the heating plate, the temperatures of the surfaces being measured while the boiler was in operation.

Pittsburgh and Nearby Districts

The Locomotive Stoker Company, an interest of the Westinghouse Air Brake Company, East Pittsburgh, has taken over the foundry on the North Side, Pittsburgh, formerly operated by the Westinghouse Electric & Mfg. Company, for the manufacture of a device developed by Clement F. Street. The stoker is in use on some of the larger railroad systems, doing away with the use of two firemen on heavy locomotives. It is claimed to maintain the steam pressure, and therefore the working efficiency of the locomotive, at its maximum; to produce uniformity in firing and to reduce the consumption of coal. W. S. Bartholomew is president; A. L. Humphrey and Clement F. Street, vice-presidents; F. L. Wassell, secretary; P. W. Lander, treasurer, and J. H. Eicher, auditor.

The Pittsburgh Foreign Trade Commission has been notified that N. C. Chu and Gee Sing Sam, business men of Shanghai, China, will be in Pittsburgh and will make their headquarters at the offices of the commission May 1 to 5, inclusive, for the purpose of purchasing tools, hardware, wire goods, electrical supplies, etc.

At a stockholders' meeting of the Trussed Concrete Steel Company of Youngstown, Ohio, held in Detroit, Mich., April 4, it was decided to increase the capital stock of the company \$1,000,000 for the purpose of making large extensions to the works in Youngstown.

The Aluminum Company of America, Pittsburgh, is having plans prepared for a club house, which, it is said, will be one of the finest in the country. It will be built at New Kensington, Pa., where the works of the company are located, and will cost about \$200,000. It will be used by officials and skilled employees and by graduates of the University of Pittsburgh and other institutions of learning who may be employed by the company. The main building will be 200 ft. long, two stories, fire-proof throughout. The project is in charge of Roy A. Hunt, general manager of the company.

Announcement is made by the S. Keighley M. C. & Mfg. Company and the Keighley Mfg. Company that on April 1 their office and warehouse were combined at 124 Third Avenue, Pittsburgh.

The Ceris Construction Company, Ambridge, Pa., with a capital stock of \$5,000, has been incorporated by James Ceris, Lucia Ceris and Cæsar Piantanida, to construct roads, buildings, bridges, etc.

The Sharon Hydraulic Stone Company, Sharon, Pa., with a capital stock of \$10,000, has been incorporated by William H. Garner and George W. and Melvin W. Godfrey, to manufacture blocks and erect buildings from concrete and slag reinforced with iron.

The Globe Wire Company, Sharpsburg, Pa., with a capital stock of \$100,000, has been incorporated by George P. and Elmer Loomis, Oakmont, Pa., and Edwin Kidd, Sharpsburg, to manufacture steel wire, drill rods and other articles of iron and steel.

The Garey-Kissane-Hampton Company, Pittsburgh, with a capital stock of \$7,500, has been incorporated by Edward S. Garey, Joseph Kissane and R. E. Hampton, all of Pittsburgh. James B. Cochran, 142 Craft Avenue, Pittsburgh, is treasurer. The new company will manufacture architectural, structural and ornamental iron and steel and has taken over the business and equipment of Joseph Kissane and Edward S. Garey at 901 Pennsylvania Avenue, Pittsburgh, and also the business and equipment of R. E. Hampton & Company, at the same location.

The Sheesley Supply Company, Inc., Johnstown, Pa., with a capital stock of \$50,000, has been incorporated by M. M., Fred K., J. D. and F. M. Sheesley, all of Johnstown, and Horace A. Sheesley, Sebago Lake, Maine, to purchase and sell builders' supplies.

The Allen Motor Company, Fostoria, Ohio, has granted its employees a 9-hr. day with the same pay as for the former 10-hr. day.

The Westinghouse Air Brake Company, Wilmerding, Pa., has increased the bonuses offered employees from 6 to 12 per cent. Large orders recently taken by

the company for shrapnel for early delivery, and its desire to get out as great a product as possible, are said to have been responsible for the increase.

New Haven Engineers' Spring Meeting

The New Haven section of the American Society of Mechanical Engineers held its spring meeting at New Haven, Conn., April 5, with civil, electrical and mining engineers as its guests. The afternoon session was held in the Mason Laboratory of Mechanical Engineering, Sheffield Scientific School, with Dr. Lester P. Breckenridge as chairman. An interesting address on "The Water Powers of New England," illustrated with lantern slides, was made by H. I. Harriman of Boston. The development of hydroelectric plants on the Deerfield and Connecticut rivers was described in considerable detail, and the network of transmission lines from these plants to the inter-connecting steam plants on the shores of Narragansett Bay in Rhode Island showed the scope of the development work of electric power transmission by the largest company in New England.

The remainder of the afternoon was devoted to a general discussion of "The Power Requirements of Connecticut." The discussion was opened by R. J. S. Pigott, power superintendent of the Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn. His description of the big power plant of the Remington Company produced a lively discussion of power plant equipment and operating methods, and he was questioned at considerable length by the large audience.

Following a dinner in Memorial Hall, the evening session was held in the large auditorium of North Sheffield Hall. The speaker was Samuel Insull, president Commonwealth Edison Company, Chicago. Due to his long connection with power plants, from the days of the first central station, and his intimate connection with the development of electric power since then, he was enabled to present his subject, "The Progress of Economic Power Generation and Distribution," with a wealth of personal recollection and to support his statements with an abundance of facts and figures which will make his address long remembered by those who were fortunate enough to hear it. He made his talk the more interesting by showing views of generators, prime movers and power plants that covered the development of central stations and apparatus during the entire life of the industry. He was introduced by President Hadley of Yale University.

The Buffalo, Rochester & Pittsburgh Railroad is building a new dock, 600 ft. in length, on the Buffalo River at Buffalo, intended principally for handling pig iron, pulpwood and other heavy commodities. It will have three tracks, and the unloading equipment will consist of Brown hoists, magnet cranes, etc. The channel at this dock is 23 ft. in depth, enabling the largest boats on the Lakes to load and unload cargoes. Work has been in progress all winter and it is expected the dock will be completed for use at the opening of navigation.

The Roberts Tool Company, 391 Mulberry Street, Newark, N. J., has been incorporated to manufacture rivet sets and other shock resisting tools by a newly developed process. It involves the use of a special analysis steel which is subjected to a heat-treating process that gives the exterior of the tool great heat-resisting qualities. By virtue of soft cores, the rivet sets and other tools will not break at the shank. The company will begin to manufacture early in May.

The blast furnace of the Atikokan Iron Company, Fort William, Ontario, Canada, will be put in commission this summer. Operations at the Atikokan mines are to be resumed at once. When the furnace was active a few years ago, it was found that the ore contained a considerable amount of sulphur, causing trouble in disposing of the iron, but the necessary remedy has been found to overcome this.

Machinery Markets and News of the Works

TOOL TRADE THRIVING

Activity Creating Optimism in Far West

More Care Shown in Buying—No Longer a Mere Matter of Deliveries—Purchases of Single Tools Noteworthy Feature

Throughout the country a general state of prosperity prevails in the machinery trade, so much so that it is difficult to determine what phase of the situation deserves emphasis. It is certain that the gigantic war orders are past; also that there is normal, healthy activity on the part of peaceful industry. At the same time, salesmanship is counting for more, and it is less a question of merely selling deliveries. Most buyers are inclined to pause and ascertain the machine best fitted to their needs before buying. New projects and extensions to establish plants are widely reported.

A wave of optimism is sweeping over the Pacific Northwest. The Chicago, Milwaukee & St. Paul Railroad in its car shops at Tacoma, Wash., has placed 1000 men on extra time, and increased the hours of 500 men in its locomotive shop from 8 to 9 hr. Shipbuilding and the construction of shipyards in the Northwest show unprecedented activity, and the logging and cannery industries are thriving. The San Francisco market is also brisk, despite withdrawal of some inquiries.

Orders for single machines from scattered sources make a heavy aggregate in Cleveland, and the only drawback is delay in securing raw material, or difficulty in making deliveries because of the car shortage. The Cleveland Milling Machine Company recently incorporated with a capital stock of \$100,000 will soon begin the erection of a plant.

Milwaukee notes some improvement in deliveries of machine tools, largely due to the enlarged facilities of the builders. Gas engine and farm implement makers are insistent buyers in that city.

Labor troubles show no further signs of development in Cincinnati; no further demands have been made, and practically all of the shops supposed to be under strike are working more men than usual.

The Chicago Pneumatic Tool Company has awarded the contract for an addition to its Detroit plant.

The New York demand is quieter, on the whole, although many types of machines continue in good request. The Ransome Concrete Machinery Company, Dunellen, N. J., will proceed with the enlargement of its plant under reorganized management. F. L. Smidth & Co., are building an extension to their machine shop at Elizabeth, N. J.

The Hess Machine Company, Philadelphia, Pa., has prepared plans for a new machine shop 55 x 120 ft., one and two stories.

Business in Chicago has been largely confined to single-tool sales. The Albaugh-Dover Company, Chicago, maker of cream separators and gear cutters, is in the market for a number of machines to equip a new shop.

The Atchison, Topeka & Santa Fe Railroad has ap-

propriated \$60,000 for its shops at Topeka, Kan. St. Louis reports that new enterprises are being established in that district faster than equipment can be obtained.

The Morse Twist Drill & Machine Company, New Bedford, Mass., is making additions to its plants at a cost of \$204,000. The New England Brass Company, Taunton, Mass., plans the erection of a brass rolling mill and casting shop to cost \$125,000.

Big projects are under way in Canada. The Canadian Northern Railway has terminal undertakings which will cost about \$10,000,000, and involve the purchase of machinery of various kinds. The Blystone Mfg. Company, Cambridge Springs, Pa., has purchased a site at Niagara Falls, Ont., and shortly will commence the erection of a plant for the manufacture of concrete machinery, etc. A shipbuilding plant is to be built at Port Moody, B. C.

New York

NEW YORK, April 12, 1916.

Certain types of machines continue in excellent demand, but the general situation is much quieter. Dealers who handle a wide range of machine tools find a decided lessening of interest on the part of buyers. They are somewhat puzzled over the large quantity of used machine tools which are appearing on the market. Most of these tools are so old or in so bad a state of repair that they are designated "junk," yet excessively high prices are asked for them. It is wondered where all the old equipment came from. Good used tools are not plentiful, command good prices and there is no difficulty in selling them.

The lathe situation continues to grow easier, a fact which is indicated by the freer offerings of those who went into the business of manufacturing lathes a few months ago. These makers are not only seeking business, but have reduced their prices, one of the latest to take this action being a large manufacturer of wood-working machinery.

It is evident that buying of machinery is rapidly approaching a basis of normal conservatism. To quote one field engineer: Buyers are coming to their senses and taking stock of things. Salesmanship is resuming its proper place, and it is no longer a mere question of selling deliveries. Buyers are showing more willingness to wait for the machines which fit their needs precisely, and are not inclined to consider make-shifts as they were a few months ago.

Makers of standard machine tools continue to increase their production facilities. Most of them will be busy for some months in filling the orders on their books.

Russian buying is more active, but the export trade otherwise is quiet.

The activity in boring mills, large turret lathes, and a few other types is unabated. Prices continue strong, and in one or two instances were advanced April 1.

Several of the railroads are showing interest, especially in turret lathes. Purchases have been made by the Cincinnati, Hamilton & Dayton, Baltimore & Ohio, Philadelphia & Reading and Seaboard Air Line.

The Turbo Gear Company, Baltimore, Md., is interested in general machine shop equipment.

Agar, Cross & Co., Ltd., 11 Broadway, New York, are making inquiry for a large amount of equipment suitable for the manufacture of rifles.

The Ransome Concrete Machinery Company, Dunellen, N. J., has been reorganized and executive offices have been established at 115 Broadway, New York. It has obtained ample capital to enlarge and modernize its plant. E. L. Ransome, founder of the business, will remain with the new company as chairman of the board of directors and consulting engineer. Frank L. Brown of San Francisco, formerly with the Carey & Moen Company, etc., has been made president. Howard K. Brooks, vice-president of the American

Express Company, G. F. Steele, general manager of the News Print Mfg. Association, control the majority of the preferred stock of the Ransome Company, which is in turn owned by interests associated with the International Harvester Company. F. M. Smith, a famous producer of borax, H. M. Brittan, for over twenty years with the Washburn & Moen Mfg. Company of Worcester, with the foregoing men, constitute the board of directors. A. J. Norton is secretary and J. J. Givens is treasurer.

The Vulcan Rail & Construction Company, 35 Meserole Avenue, Brooklyn, N. Y., manufacturer of pipe railings, wrought-iron picket fencing, and bridge railings, has increased its capital stock from \$40,000 to \$100,000, in order to take care of its business, which has increased so rapidly in the past two or three years that the former capital was insufficient. The whole increase has been entirely subscribed for by the stockholders. The company's works are at Meserole Avenue and Banker Street, Brooklyn.

F. L. Smidth & Co., engineers, 50 Church Street, New York, are building an addition to their machine shop at their plant on North Avenue, Elizabeth, N. J., for which the American Bridge Company has the structural contract. They are contemplating the erection of an addition to their foundry. George W. Newcomer is vice-president.

The Durham Duplex Razor Company, Jersey City, N. J., one building of whose plant was destroyed by fire March 19, has leased the Spindler & Deringer Building at Mercer and Colgate streets, in which it has installed a quantity of machinery salvaged from the burned plant. Although occupying one-third of its former floor space and employing less than one-third its former normal equipment, by operating three shifts it is producing its normal average of 9000 razors a day. It is expected that its new plant under construction on Baldwin Avenue will be ready for occupancy by May 15. It is believed that 16 blade-making machines are among the equipment destroyed. Thomas C. Sheehan is vice-president and general manager.

The Kindel Bed Company, 254 Norman Avenue, Brooklyn, N. Y., has leased from the Degnon Terminal & Realty Improvement Company a four-story factory, 100 x 230 ft., which will be erected for it on Anable Avenue and Creek Street, Long Island City.

The Newell Mfg. Company, Ogdensburg, N. Y., manufacturer of curtain rods and stamped brass and steel metal goods, will erect a storage room, 35 x 75 ft., to allow for a corresponding expansion of its machine shop. A few months ago its brass factory at Prescott, Ont., was enlarged and still needs further expansion. Edgar A. Newell is president, and W. Allan Newell is treasurer and manager.

The Mica Insulator Company, 68 Church Street, New York, has had plans drawn by W. H. Stoddard, 9 East Fortieth Street, New York, for the construction of a four-story manufacturing building at Schenectady, N. Y.

The Rubber Insulated Metals Corporation has taken over the former Century rubber plant at Plainfield, N. J., and is operating it in the manufacture of insulated wire, pliers, tires and couplings. Charles P. L. Huston is president.

The H. H. Franklin Mfg. Company, Syracuse, N. Y., automobile manufacturer, has had plans drawn by R. J. Reidpath & Son, Buffalo, for a building which will be erected by the W. J. Burns Company, Bastable Block, Syracuse.

The Niagara Searchlight Company, Niagara Falls, N. Y., has had plans drawn by Simon Larke, 719 Main Street, Niagara Falls, for a factory addition to cost about \$8,000.

The Covert Mfg. Company, Lockport, N. Y., has let contract to Manion Brothers, Rochester, N. Y., for the erection of a factory to cost about \$70,000. J. L. Tyler, Insurance Building, Rochester, is the architect, and the F. L. Heughes Company, South Avenue, Rochester, has been awarded the structural contract.

Charles Weihe, Bay Street and Williams Avenue, City Island, New York City, had preliminary plans drawn by Charles Schaeffer, Jr., 401 Tremont Avenue, New York, for the erection of a five-story garage, 85 x 152 ft., to cost about \$50,000.

The Cyphers Incubator Company, Buffalo, will build a two-story reinforced concrete addition to its plant at Dewey Avenue and the New York Central Railroad Belt Line, to cost \$35,000. G. M. Curtis is president.

The Buffalo Fuel Company, Marine Bank Building, Buffalo, has purchased 500 ft. of frontage on the Buffalo River and will erect a fuel trestle, equipped with coal-handling machinery for supplying steamers.

A bond issue of \$40,000 has been voted by North Tonawanda, N. Y., to purchase boilers, pumps and other pumping station equipment.

The Onondaga Litholite Company, Syracuse, N. Y., is having plans drawn for an addition to its factory to cost \$15,000.

The Houk Company, Buffalo, manufacturer of wire wheels for automobiles, is completing plans for an addition to its plant at Elmwood Avenue and the New York Central Railroad.

The Habirshaw Electric Cable Company, Yonkers, N. Y., has awarded contract for the erection of a two-story brick addition to its plants to cost \$40,000.

The General Electric Company, Schenectady, N. Y., has completed plans for additions to be made to its plant on the River Road.

Bids are being received this week by the board of water and light commissioners of the city of Jamestown, for one 1000-kw. turbine generator.

Articles of incorporation have been filed by S. Sternau & Co., Inc., Mamaroneck, N. Y., with a capital stock of \$150,000, to make devices for cooking, gas and electric fixtures, novelties, etc. S. Sternau, L. Sirassburger, 160 John Street, Brooklyn, and H. Plant, 432 East Twenty-third Street, New York, are the incorporators.

The In Vu Company, Rochester, N. Y., has filed articles of incorporation, capitalized at \$50,000, to manufacture mail boxes, building novelties, etc., and will equip a plant. H. P. Sickels, 399 Alexander Street, J. J. Mason and J. E. Embrey, Rochester, are the incorporators.

Plans are being prepared for additions to the plant of the Ludlum Steel Company, Watervliet, N. Y., by Thorton W. Price, Woolworth Building, New York, engineer.

Philadelphia

PHILADELPHIA, Pa., April 10, 1916.

Freight embargoes have not annoyed this district as they have New England; but recently the Atlas Nitrate Products Company, Mount Carbon, Pa., was closed down on account of failure to get essential materials.

Permit has been granted to the Peoples' Brothers, Inc., contractor, Commercial Trust Building, Philadelphia, for the erection of a one-story brick powerhouse on Southampton Street, west of Meetinghouse Road, for the city of Philadelphia at a cost of about \$37,000.

The Hardwick & Magee Company, carpet maker, Seventh Street and Lehigh Avenue, Philadelphia, has had plans prepared by Ballinger & Perrot for a pumphouse of reinforced concrete.

The Philadelphia Textile Machinery Company, Hancock and Somerset streets, Philadelphia, has awarded contract to the Hennebique Construction Company, Drexel Building, for the construction of a one-story reinforced concrete factory, 251 x 261 ft., to cost about \$100,000.

Alexander Brothers, 414 North Third Street, Philadelphia, are receiving estimates for the construction of additions, four stories, 37 x 88 ft., and five stories, 72 x 90 ft., to their plant for the manufacture of leather belting. The George F. Pawling Company, 1432 South Penn Square, Philadelphia, is the engineer.

The Ajax Metal Company, Frankford Avenue and Richmond Street, Philadelphia, has had plans prepared by M. Ward Easby, Crozer Building, for the erection of a four-story addition to its factory, 40 x 80 ft., of concrete and steel.

The Hess Machine Company, 2512 Callowhill Street, Philadelphia, has had plans prepared and is receiving estimates for the construction of a one and two story brick and stone machine shop, 55 x 120 ft., to be erected at Forty-fifth Street and Lancaster Avenue.

Bradlee & Co., 726 Richmond Street, Philadelphia, chain makers, have awarded contract to Robert Beatty & Bro., 2321 East Fletcher Street, for repairing damage by fire to its building to cost about \$1,500.

The Artillery Fuse Company, Wilmington, Del., has filed plans for another addition to its plant in South Wilmington to cost about \$28,000.

The Boyertown Burial Casket Company, manufacturer of bronze, metallic, hardwood caskets, etc., will erect a four-story building, 40 x 125 ft., with basement at its plant at Topton, Pa. M. R. Strunk is factory superintendent.

The Union Furnace Mfg. Company, manufacturer of agricultural implements, skates, torches and other pressed steel specialties, Union Furnace, Pa., suffered a serious loss by the destruction of its plant by fire March 24. It will rebuild the plant, but other details of reconstruction are not yet determined upon. The company employed from 35 to 50 men. H. Himmelwright is secretary and treasurer.

The Pennsylvania Optical Company, 128 South Fifth Street, Reading, Pa., has had plans drawn by Fred A. Muhlenberg, 706 Colonial Trust Building, Reading, for a three and one-half story factory, 50 x 100 ft., and one and one-half story buildings, 30 x 60 ft., and 50 x 100 ft. Bids will be taken about April 15. H. L. Miller is manager.

The United States Lock & Hardware Company, Columbia, Pa.; C. G. Sauer, proprietor, has purchased ground for the erection of additional buildings.

The Textile Machine Works, Reading, Pa., has increased its capital stock from \$60,000 to \$1,500,000.

New England

BOSTON, MASS., April 10, 1916.

The modification of embargoes continues, and day by day the freight situation grows less serious. Congestion will doubtless continue for a long time, more because of the huge tonnage offered than because of the weather conditions or the shortage of equipment and men, which have been large factors heretofore. Changes in the rules on demurrage permitting increased charges under certain conditions will help to remove the congestion at large centers and terminals. But few shortages of coal and raw materials are now being reported.

The threatened strike of shop craftsmen of the New York, New Haven & Hartford Railroad has been obviated by the granting of an increase of 1¼c. an hour to the 4500 hands employed in the company's shops.

The Rockwell-Drake Company, Plainville, Conn., is planning an addition, 100 ft. square to its plant which has just reached completion. The company is planning to be in a position to take care of large requirements.

The Boston & Maine Railroad is to build a machine repair shop, 41 x 88 ft., at Portsmouth, N. H., to replace one destroyed by fire Nov., 1914.

The Gillette Safety Razor Company, Boston, Mass., is planning to erect a seven-story addition to its plant in South Boston.

The New England Brass Company, Taunton, Mass., has been incorporated with capital stock of \$125,000. William M. Lovering is president and Frederick H. Gooch treasurer. It plans to build, on Park Street, a rolling mill, 60 x 125 ft. and a casting shop, 50 x 60 ft., to be completed in June.

The American Brass Company, Waterbury, Conn., has given its salaried employees a 10 per cent bonus covering the period from Jan. 1 to April 1. The laborers were given a similar bonus some time ago.

The Morse Twist Drill & Machine Company, New Bedford, Mass., is to make additions costing \$204,500. The main addition will be four stories, 367 ft. long, with the width varying from 60 to 80 ft.

The Stafford Worsted Company, Stafford Springs, Conn., is receiving bids for the erection of a power plant, one story, 30 x 40 ft.

The Sterling Blower Company, Hartford, Conn., has plans for two one-story additions, 32 x 180 ft., and 42 x 130 ft.

The Iver Johnson's Arms & Cycle Works, Fitchburg, Mass., has been incorporated, with a capital stock of \$600,000. John L. Johnson is president and Walter O. Johnson treasurer.

The American Steel & Wire Company, Worcester, Mass., has secured a permit for an addition to its two-story brick power house on Grove Street.

The Ball & Roller Bearing Company, Danbury, Conn., has increased its capital stock from \$100,000 to \$1,000,000.

The Norfolk Mfg. Company, Norfolk, Conn., has purchased the Center School property, which it will remodel for manufacturing purposes.

The Torrington Mfg. Company, Torrington, Conn., has increased its capital stock from \$200,000 to \$250,000.

The Simplex Mfg. Company, Newton, Mass., has been incorporated, with capital stock of \$5,000. William H. DeMelle is president and Allen F. Carver, treasurer.

The American Pin Company, Waterbury, Conn., has awarded a contract for an addition, 42 x 137 ft., with ell 25 x 28 ft., one story.

A. H. Wells & Co., Inc., Waterbury, Conn., is having plans drawn for a factory, 100 x 160 ft., to be erected on land recently bought on Watertown Avenue. A boiler house, 25 x 30 ft., and a coaling station, 20 x 80 ft., will also be erected.

The Franklin Paper Company, Holyoke, Mass., is receiving bids for the erection of a one-story boiler house, 50 x 50 ft.

H. D. Smith & Co., Plantsville, Conn., have awarded a contract for a new die house, 26 x 66 ft.

The Bridgeport Brass Company, Bridgeport, Mass., has announced a bonus of 5 per cent on all wages earned during the first quarter of 1916, amounting to \$30,000.

Baltimore

BALTIMORE, MD., April 10, 1916.

The Maryland Metal Cross Tie Company, Havre de Grace, Md., are having plans drawn by Thornton W. Price, Woolworth Building, New York, for a large steel foundry.

George Harryman & Bro., Fleet and Spring streets, Baltimore, broom manufacturers, have purchased five dwellings on Caroline Street and will construct a broom factory.

Two buildings are to be constructed by the F. X. Ganter Company, manufacturer of store fixtures, showcases, etc., to replace the plant at Sharp and Ostend streets, which was destroyed by fire. One will be 66 x 156 ft., five stories, while the other will be three or four stories, 72 x 200 ft.

The City Point Motor Company, Hopewell, Va., has been incorporated with \$10,000 capital stock. J. M. Thompson is president.

The Dubois Gasifier Corporation, Norfolk, Va., has been formed with \$15,000 capital stock. George A. Dubois is vice-president.

The commissioners of St. Michaels, Md., are authorized to erect an electric light, heat and power plant to cost \$8,000.

The Town Commissioners, Centreville, Md., have been empowered to borrow \$8,500 for purchasing an oil-burning engine and an electric generator for the municipal plant.

Milwaukee

MILWAUKEE, WIS., April 10, 1916.

Orders for milling machines, lathes and other machine tools are coming from practically every metal-working trade, and consist mainly of single tool requirements or small lots. An improvement in deliveries is noted, due to enlarged capacities of tool builders, and this situation will probably be bettered in the next sixty days. Gas engine and farm implement makers are insistent buyers, shops being operated at full speed. An almost unprecedented demand exists for cranes. The March report of the free employment division of the State industrial commission shows that calls for machinists cannot be filled, and the demand for foundry labor has not been so good for several years. With the exception of a strike of wood-workers in the Milwaukee road shops, the labor situation is quiet. The walkout came just as a general wage increase had been fixed upon.

A new factory on Broad Street will be erected for the Oshkosh Mirror Works, Oshkosh, Wis., on a site 110 x 230 ft. The quarters at 42 Ceape Street have been overcrowded for many months.

The Pawling & Harnischfeger Company, Thirty-eighth and National avenues, Milwaukee, manufacturer of cranes and hoists, is preparing to build new blacksmith and cutting-off shops. Plans have been prepared by Kirchhoff & Rose, architects, 1312 Majestic Building. It is tripling the size of its pattern shop and storage vaults and has not experienced so great a rush of business since its establishment.

The Sharp & Denicke Auto Company, Juneau, Wis., will erect a 40 x 100 ft. addition to its garage and will devote most of the space to a machine shop.

The Kero Carburetor Company has been incorporated with a capital stock of \$15,000 by Milwaukee interests to manufacture fuel vaporizing devices for internal combustion engines and other engineering specialties. The incorporators are R. N. Van Doren, J. J. McJeskey and W. G. Gehra.

Edward S. Wittwer & Bros., Monticello, Wis., awarded the contract for a new cold storage warehouse and refrigerating plant to Wagner & Baumann, Monroe, Wis. It will be of reinforced concrete, 50 x 100 ft., three stories and basement, and cost \$35,000.

H. Whitten will build a garage, 35 x 70 ft., two stories and basement, at 100 Eighth Street, Milwaukee, at a cost of \$8,000. The engineers are Kamschulte & Webster.

Bids for the erection of a packing plant, cold storage and power plant producing 400 hp. for the Farmers' Co-Operative Packing Company, Madison, Wis., will be taken until April 17 by Gardner & Lindberg, architects, 140 South Dearborn Street, Chicago. The main building will be four stories, 90 x 225 ft., of reinforced concrete. A. B. McCue is general manager.

Reports from Green Bay, Wis., state that the Chicago &

Northwestern Railroad Company will build a new car and general repair shop this year. Plans were prepared several years ago for this work, but held in abeyance pending improvement in conditions. The building will be of brick and steel, 80 x 200 ft., one and two stories, and will require a considerable list of tools and machinery. W. H. Finley, Chicago, is chief engineer.

Paul Pirwitz, Marshfield, Wis., awarded the general contract to Krasin Brothers for erecting a garage and repair shop at Fourth and South Maple streets.

The Badger Auto Body Company, Milwaukee, is establishing a factory for the manufacture of delivery and commercial bodies for automobiles in the unused two-story factory on Lisbon Avenue, at the intersection of the Milwaukee road tracks. Contracts for the equipment have been placed.

The Standard Gas Saver Company, Racine, Wis., has been incorporated with a capital stock of \$10,000 by M. E. Walker, H. R. Simms and C. V. McAvoy. A factory for the production of automobile engine devices will be established at once.

The North Avenue Investment Company, Milwaukee, has awarded contracts for the erection of a garage and repair shop on North Avenue, near Holton Street.

The Rice Lake Motor Car Company, Rice Lake, Wis., is building a new garage and service station, 66 x 132 ft.

The International Metal Company, Superior, Wis., has been incorporated with a capital stock of \$100,000, by H. J. O'Brien, J. E. Greenfield and H. E. Greenfield.

The Western Steel & Iron Company, De Pere, Wis., has completed work on a brick and steel shop addition, 65 x 110 ft., and is occupying the second floor only until spring, when concrete floors will be laid on the ground floor. The additional space has been needed for a long time, but construction work was delayed by municipal legislation over street vacation.

Emil Estberg, Milwaukee, will remodel the building at Wisconsin and Van Buren streets into a garage, to be ready June 15. S. J. Brockman, 421 Stephenson Building, is general contractor.

The Felker Brothers Mfg. Company, Marshfield, Wis., has changed from a partnership to a corporation under the same name. The capital stock is \$70,000. The company lost its plant by fire in December and has completed rebuilding work. In addition, it has an annex, which is being equipped exclusively for the production of corrugated sheet metal culverts, road drags and barn equipment, and the new main shop will produce tanks, tank heaters, well casings, etc. The officers are: President, A. G. Felker; vice-president, D. L. Miller; secretary, L. H. Felker; treasurer, R. T. Finucane.

The Wattles Rail & Dock Company has been organized at Green Bay, Wis., with a capital stock of \$10,000. The incorporators are H. S. Barkhausen, E. N. Murphy and C. R. Murphy.

The Arcadia Building, Wells Street, from Sixth to Seventh streets, Milwaukee, will be rebuilt and part of it used as a garage by Frank Mulhern, 226 Grand Avenue.

The Wisconsin Gas & Electric Company, Milwaukee, a subsidiary of the Milwaukee Light, Heat & Traction Company, will install a 1250 kw. generating unit in the distributing station at Watertown, Wis., during the summer. About \$50,000 will be expended in improvements at Watertown.

Hogg & McManners, Black River Falls, Wis., have broken ground for a new garage, 45 x 120 ft., one story and 12 ft. basement.

Racine, Wis., closes bids April 29 for remodeling a fire engine house into a municipal garage and repair shop. Charles Ryba is city clerk.

Clement W. Inglis, secretary Milwaukee Steel Foundry Company, and Charles Inglis, for 28 years with the Milwaukee branch plant of the International Harvester Company, have purchased the major interest of the Wallman Mfg. Company, 283-291 Fifth Avenue, Milwaukee, manufacturer of tanks and pumps, and have reorganized it under the style of Inglis Mfg. Company. The works will be enlarged and new equipment installed. It will feature gasoline and oil storage systems for garages.

The Bain Wagon Company, Kenosha, Wis., has broken ground for a brick and steel addition, 75 x 200 ft., for factory and warehouse purposes, to cost about \$60,000. George A. Yule is secretary and treasurer.

Work has begun on the new five-story shop, office and warehouse building for the Aluminum Goods Mfg. Company, Manitowoc, Wis., to cost in excess of \$100,000. It is expected the building will be ready for occupancy about Sept. 1.

John Englund, village clerk, Wittenberg, Wis., closes bids April 19 for a 15-hp. kerosene engine and a triplex power

pump for the municipal waterworks system. W. G. Kirchoffer, Madison, Wis., is consulting engineer.

The Mechanical Appliance Company, 133 Stewart Street, Milwaukee, manufacturer of electric motors, dynamos, ventilating fans, etc., is building a new machine shop, 30 x 130 ft., one story, and is buying a small list of tools. Frederick H. Ford is secretary.

The Milwaukee Electric Railway & Light Company, Milwaukee, has purchased an entire block on the Lake front at Racine, Wis., including the property of the defunct Racine Stool Mfg. Company, and adjoining the gas plant of the Wisconsin Gas & Electric Company, a subsidiary of the Milwaukee corporation. No improvements will be made at once, but the property was purchased as a site for repair shops and car barns for the Milwaukee-Racine-Kenosha division.

The sheet metal business of George A. and Arthur F. Trachte, Midlin and Dickinson streets, Madison, Wis., has been incorporated under the style of Trachte Brothers Company, with a capital stock of \$15,000. J. H. Albrecht and J. J. McManamy are associated with the company.

Chicago

CHICAGO, ILL., April 10, 1916.

Except for some new inquiry in this market the past ten days for tools for export, recent business has had most largely to do with sales of single machines to manufacturers within a small radius. The Albaugh-Dover Company, Chicago, is in the market for a number of machines for its new shop and the Atchison, Topeka & Santa Fe Railroad has made an appropriation providing for tools to cost \$60,000 for improvements at Topeka. The extension of plants to provide additional machine shop capacity continues at an exceptional rate, and, considered in the light of high prices that must be paid for equipment, constitutes an especially strong indication of the urgency and volume of business.

The Union Sheet Metal Works, Chicago, formerly located at 3812 West Madison Street, has removed to a larger shop at 1551 South St. Louis Avenue.

The Shillo-Vogt Company, Chicago, incorporated to engage in structural steel and ornamental iron work, has recently built a shop which will be equipped to permit of handling a wide range of work.

The Imperial Pump & Tool Company, Chicago, has been organized with a capital of \$20,000, by R. L. Otwell, 8 South Dearborn Street, J. Ross Melvin and W. O. Hopkins, Jr.

The Crampton Mfg. Company, Chicago, has been organized with a capital of \$10,000 by Frank H. Whitten, 2817 West Congress Street, C. M. Thom and John P. Schmidt.

The Kainer Mfg. Company, Chicago, maker of automobile parts and pumps, has moved to 761 West Mather Street, where a brass foundry has been added to its facilities.

The Justrite Mfg. Company, Chicago, maker of hardware specialties, has under construction a new factory at Southport Avenue and Kingsbury Street, which will provide a floor area of 50,000 sq. ft. New machinery will be installed.

A. B. Dick & Co., 736 West Jackson Boulevard, Chicago, are about to erect a seven-story brick factory at 741 West Jackson Boulevard to cost \$60,000.

The Albaugh-Dover Company, 2100 Marshall Boulevard, Chicago, manufacturer of cream separators and gear cutters, has had plans prepared by Robert M. Hyde, 116 South Dearborn Street, for a one-story machine shop, 90 x 175 ft., to cost about \$30,000. It is in the market for a number of machine tools. George S. Albaugh is president and treasurer.

The Briggs-Chicago Company, North Chicago, manufacturer of dump wagons, will resume operations after a shutdown lasting several months.

The Sterling Machine Works, Sterling, Ill., has acquired the shop of the Twin City Machine Works. It will erect an addition and equip for automobile and general repair work. L. E. Thompson is proprietor.

The plant of the Mosely Machine & Tool Company, Elgin, Ill., manufacturer of watchmaker's tools and surgical instruments, was seriously damaged by fire.

The Peter Brothers Mfg. Company, Algonquin, Ill., manufacturer of woodstock safety tapping chucks, automatic reversing attachments, tapping machines and abrasive machine cutters, is building a two-story brick and cement addition to its plant, 45 x 120 ft., to cost \$10,000. George E. Mosely, Elgin, Ill., is the architect.

The William Warnock Company, Sioux City, Iowa, has completed its two-story brick factory for the manufacture of tanks and sheet metal specialties and is installing machinery.

The Patent Novelty Company, Clinton, Iowa, has awarded

contracts for a factory, 90 x 244 ft., to cost \$35,000. The machine shop will occupy 133 ft., and is to embody in its construction the most modern devices.

The Shrauger & Johnson Company, manufacturer, Atlantic, Iowa, has acquired property adjoining its plant and extensions are to be made at once.

The Iowa Railway & Light Company, Boone, Iowa, has completed plans for an electric light and heating plant to cost \$100,000.

The St. Paul Structural Steel Company, St. Paul, Minn., is adding a small extension to its works at York and Agate streets.

M. D. Pendergast, Stillwater, Minn., is making plans for the location of a plant to manufacture wire fencing. The organization is under way and plans for the machinery equipment are being prepared.

Brown, Blodgett & Sperry, St. Paul, Minn., are about to erect a three-story factory, 100 x 150 ft., to cost \$50,000.

The Atchison, Topeka & Santa Fe Railroad has made an appropriation of \$150,000 for new shops at Topeka, about \$60,000 of which is to be expended for machinery. A large part will be for blacksmith shop equipment.

The Marvel Steel Products Company, recently incorporated to manufacture curtain rods and miscellaneous steel and metallic specialties, is located in the Monon Building, Chicago, Ill., not at 712 West Thirty-third Street, as stated in THE IRON AGE of March 30. William G. Root is manager.

Cleveland

CLEVELAND, OHIO, April 10, 1916.

A heavy demand exists for single machine tools, orders being well scattered among various metal-working industries. Some inquiry is coming out for machinery for new plants. While the volume of business is large, it would be considerably greater were machine-tool builders able to make reasonably early deliveries. Many users on finding that they will have to wait several months for one or two additional machines do not place the order. Several inquiries for round lots of lathes for Russia are pending. Production in some plants is curtailed by delay in securing stock or by delay in shipping products because of the car shortage. The demand for cranes is heavy and some good business is pending from the railroads in ore and coal-handling equipment. Foundries are crowded with orders and deliveries on castings are slow. Molders are scarce. Some plants are running considerably below capacity because of their inability to secure men.

The Cleveland Milling Machine Company, Cleveland, Ohio, has been incorporated with a capital stock of \$100,000 to bring out a new milling machine of the Knee type and to manufacture milling cutters. Those actively interested are Frank A. Shields, formerly with the National Tool Company, Cleveland, and John A. Camm, who has severed his connections with the Kearney & Trecker Company, Milwaukee, Wis. Temporary offices have been opened at 318 Engineers' Building. The company will shortly begin the erection of a plant, plans for which are now being prepared. Negotiations have been practically closed for a site adjoining the plant of the White Tractor Company on Euclid Avenue.

The Beryk Company, Cleveland, recently organized to build vibrators and vibrator equipment for foundry use, has established a plant at 1265 West Second Street. Harry H. Barclay is general manager.

The Elyria Strip Steel Company, Elyria, Ohio, has been organized to manufacture hot and cold rolled strip steel. It expects to build a plant shortly, having secured an option on a site near the plant of the Columbia Steel Company.

The Gschwind Furnace Company, Youngstown, Ohio, has been incorporated with a capital stock of \$250,000 by Carl E. Gschwind, Charles F. Ritter, Walter G. Scott, R. W. Archer and Dwight Harrison. W. W. Watson, who has been interested in the partnership under which the company has been operated, will be president. In addition to its products of warm air furnaces and ventilating apparatus, various specialties will be manufactured. Plans are being prepared by Ernest McGeorge, engineer, Cleveland, for a new two-story concrete building, 60 x 200 ft. A heating plant will be installed, but power equipment will not be provided.

The Goodyear Tire & Rubber Company, Akron, Ohio, will make further extensions to its plant by the erection of two large buildings, one to be used for the mechanical goods department and the other for reclaiming rubber.

The Doehler Die Castings Company expects to have its new plant at Toledo ready for occupancy in May. It will include a one-story and basement building for white metal die casting, a two-story and basement manufacturing building and a brass and white-metal foundry. It is stated the manufacture of bearings will be added to its products.

Frank O'Neil, president O'Neil Machine Company, Toledo, Ohio, is president of the recently organized Toledo Bottle Company, capitalized at \$80,000, which will shortly build a bottle manufacturing plant.

The Marion Tire & Rubber Company, Marion, Ohio, has approved plans for a new two-story factory, 60 x 150 ft., and a power plant, 40 x 80 ft.

The National Cog Company, Delphos, Ohio, has been incorporated with a capital stock of \$180,000 to manufacture cogs for automobile parts. Operations have begun.

The Sandusky Road Machinery Company, Sandusky, Ohio, has been incorporated with a capital stock of \$25,000 to manufacture road making machinery. Among the incorporators are George P. Chambers, P. J. Gagen, William Hendrickson and others.

Bids will be received May 1 by the city commissioners, Middletown, Ohio, for two electrically-driven centrifugal pumps each with a capacity of 2100 gal. per minute, and one high-duty steam-driven pumping unit with a capacity of 3,000,000 gal. per 24 hr.

Indianapolis

INDIANAPOLIS, IND., April 10, 1916.

The Huntington Steel Foundry Company, Huntington, Ind., newly organized, expects to have its foundry in operation by May 15. It will start with one converter having a capacity of 300 tons a month; a second converter, of equal capacity, will be installed later. A. L. White is president.

C. W. Morse, receiver, will continue to operate the plant of the Jackson Tool & Shovel Company, Montpelier, Ind., against which the Blackford County Circuit Court has given judgment for \$140,206, in favor of the H. Channon Company.

The Rochester Bridge Company, Rochester, Ind., has increased its capital stock from \$150,000 to \$190,000.

The Delta Electric Company, Marion, Ind., has increased its capital stock from \$40,000 to \$65,000.

The Standard Bridge & Culvert Company, Terre Haute, Ind., has been dissolved.

The Indianapolis Belting & Supply Company, Indianapolis, has increased its capital stock from \$100,000 to \$150,000.

The Pennsylvania Railroad Company has let a contract to the Dunn-McCarty Company, Chicago, to build 41 miles of road between Ben Davis and Frankfort, Ind., at a cost of approximately \$4,500,000. Leo H. Robbins, Indianapolis, superintendent for the contracting company, will have charge of the work. Several bridges are included in the contract.

The Indiana Fuel Saving Company, Indianapolis, has been incorporated, with \$25,000 capital stock, to manufacture heating apparatus. The directors are M. G. Greenwald, Charles Halt and Clarence Joseph.

The Kokomo Oscillating Fan Company, Kokomo, Ind., has been incorporated, with \$125,000 capital stock, to manufacture electric fans. The directors are Thomas F. English, E. B. Seaward and Frank H. Smith.

An increase in the capitalization of the Crescent Navigation Company, Evansville, Ind., from \$35,000 to \$50,000, has been provided in connection with plans to build two passenger boats to connect the traction line at Rockport, Ind., with Owensboro, Ky.

The Helfrich Lumber & Mfg. Company, Evansville, Ind., will rebuild the sawmill destroyed by fire several months ago at an estimated cost of \$50,000.

Detroit

DETROIT, MICH., April 10, 1916.

The Star Wheel Corporation, Detroit, has been incorporated with a capital stock of \$50,000 by A. J. Hall, B. F. Baldwin and Rupert Franklin. It will manufacture vehicle wheels and accessories.

The Chicago Pneumatic Tool Company, Detroit, has awarded the contract for an addition to its plant at Second and Amsterdam avenues.

The Cadillac Tool Company, Detroit, has been incorporated with \$15,000 capital stock to manufacture tools and machinery. The incorporators are E. Dubois Young, T. A. Mead and J. E. Garlene.

The Western Paper Box Company, Detroit, has been incorporated with \$40,000 capital stock to manufacture containers. Fred B. Pohl is the principal stockholder.

The Detroit Roller Latch Company, Detroit, has been incorporated with \$10,000 capital stock to manufacture locking devices. Fred W. Boston, Donald Robertson and Joseph A. Dunnaback are the incorporators.

A. M. Young & Co., Kalamazoo, Mich., have been incor-

porated with \$40,000 capital stock by Arthur M. Young, Emanuel R. Kuhn and John J. Knight and will manufacture metal and rubber specialties.

The W. K. Prudden Company, Lansing, Mich., manufacturer of automobile parts, has awarded the contract for its new factory, 70 x 685 ft., three stories, to cost approximately \$100,000.

It is reported from Bay City, Mich., that the General Motors Company has acquired the plant formerly occupied by the National Cycle Company and will utilize it for the manufacture of automobile engines.

The Billington Company is the name of a new corporation which will establish a machine shop at Bay City, Mich.

The Sparks & Withington Company, Jackson, Mich., manufacturer of automobile horns, has completed plans for a new factory the same size as its present plant. It recently increased its capital stock from \$300,000 to \$1,000,000.

The addition to be made to the plant of the Champion Ignition Company, Flint, Mich., will be 90 ft. long, two stories. The basement and first floor will be devoted to clay working and the second floor to its tool-making department. The additional space will enable the company to increase its output nearly 50 per cent giving the plant an output of 60,000 spark plugs a day.

The Lakey Foundry Company, Muskegon, Mich., has been acquired by a new organization. It will be enlarged and placed in operation with H. A. Becker, manager.

The Zagelmeyer Cement Block Machinery Company, Bay City, Mich., is building a shop 40 x 230 ft. Most of the space will be used for a machine shop.

Kompass & Stoll, Niles, Mich., have let the contract for an addition to their works, 75 x 75 ft.

Cincinnati

CINCINNATI, OHIO, April 10, 1916.

Less than two years ago shaping machines were considered almost a drug on the market. Both manufacturers and dealers had large numbers of these machines on hand that they were unable to dispose of. To-day's record is almost entirely reversed, and while fairly prompt deliveries can be made, the machines, in most cases, have to be built to order. This situation is not due entirely to an increase in the demand for shapers, but to a large extent is attributable to the fact that many shaping machine builders took on outside contracts for lathes when the war demand commenced, thus reducing the output of shaping machines.

As to the labor situation, no additional demands have been made on local machine shops and no confirmation from responsible sources can be obtained of rumors that strikes are contemplated May 1 in plants not now affected. Practically all shops that are supposed to be under a strike are working more men than in normal times. At Hamilton, Ohio, conferences have been held between shop operators and individual workmen regarding the 8-hr. day, but no demands have been made by the workmen. The molders in seven foundries in Springfield, Ohio, have presented demands for a minimum wage of \$3.50 per day. At Columbus, Ohio, one shop has been affected by a strike on the part of the machinists who demand a 9-hr. day and an increase of 12½¢ per hour.

The United States Lathe & Tool Company, Cincinnati, has been incorporated with \$20,000 capital stock by J. U. Manischewitz, Vincent H. Beckman and others. It has purchased the plant of the Queen City Engineering Company, at South and Gest streets, and will manufacture lathes.

The R. K. Le Blond Machine Tool Company, Cincinnati, has decided to increase its new plant, now under construction, by the addition of a one-story brick and steel building, 50 x 500 ft. This will give the company practically 205,000 sq. ft. of floor space when the different buildings are completed.

The Cincinnati Time Recorder Company, Cincinnati, has increased its capital stock from \$100,000 to \$350,000, and will add to its manufacturing facilities.

The Elmwood Castings Company, Elmwood Place, Cincinnati, has let contract to the McClintic-Marshall Company, Pittsburgh, for the addition to its projected foundry.

The Hamilton Welding & Mfg. Company, Hamilton, Ohio, will make a large addition to its plant for the manufacture of welding outfits.

The Miami Foundry Company, Hamilton, Ohio, has decided to move its plant to Miamisburg, Ohio, about 20 miles distant. Extra equipment will be installed and the present capacity of the plant greatly increased. W. B. Cullen is general manager.

The Dayton Steel Heat Treating Company, Dayton, Ohio, has been incorporated with \$20,000 capital stock by W. H. Hewitt, H. O. Dubbs and others.

The Dayton Body Company, Dayton, Ohio, has been in-

corporated with \$100,000 capital stock to manufacture automobile bodies. A factory will be constructed 64 x 384 ft., four stories, of brick construction. J. Dudley Art is general manager.

The Ohio Chemical Company, Springfield, Ohio, is making an addition to its plant to be used for the manufacture of magnesium chloride.

Holland & Borden, Springfield, Ohio, will erect a large garage and repair shop at Fountain Avenue and Monroe Street.

The Phelps Mfg. Company, Columbus, Ohio, has been incorporated with \$100,000 to manufacture wire automobile wheels, by H. C. Phelps and others. Its plant was formerly located at Springfield, Ohio, and operated under the name of the F. & H. Wire Wheel Company.

John A. Kelley, manager, industrial department, chamber of commerce, Columbus, Ohio, announces that the Scioto Rubber Company is the name of a new company that will be incorporated with \$100,000 capital stock to manufacture rubber fabrics and novelties. Guy C. Bowman, Columbus, will be one of the principal incorporators.

The Columbus Malleable Iron Company, Columbus, Ohio, has increased the capacity of its plant nearly 40 per cent in the past year, and contemplates still further extensions.

The Central South

LOUISVILLE, KY., April 10, 1916.

No diminution of the amount of business done by the iron and machinery trades in this section has been noted. Operations are still on a capacity basis, with excellent prospects that they will continue so. A car shortage, which has been handicapping operations to some extent, is relieved in a considerable part. The backward spring is said to be rather favorable than otherwise, inasmuch as delays in filling orders are not as important as they would be if building operations were advanced as in a normal season.

The Henry Vogt Machine Company, Louisville, reports the sale of two 300-hp. water-tube boilers to the Standard Oil Company, for installation in the plant at Casper, Wyo.

Charles Dobbs, B. H. Plaskett and Emil Von Allman have incorporated the White Tire Company with \$10,000 capital and purpose to manufacture automobile and other tires.

Louisville has inaugurated an anti-smoke campaign, with prospects that non-smoking and smoke-consuming equipment will shortly be in increased demand in that city.

The Inland Navigation Company, John H. Bernhard, New York, president, which has put a power barge into commission on the Ohio and Mississippi rivers, projects the immediate construction of 35 others. The barges are quadruple-screw, motor-driven, by five internal combustion engines. Each barge is to have wireless equipment, will draw 3½ ft. of water and have 1500 tons maximum capacity.

G. W. E. Welford, J. W. Lusby, J. A. Bagby, R. M. Bagby and J. W. Stovall have incorporated the Grayson Light & Power Company, Grayson, Ky., with \$6,000 capital.

Frank Spencer, Louisville, is at the head of a \$50,000 corporation, which is being organized at Paducah, Ky., to equip a plant and manufacture building material.

The American Auto-Arc Machine Company will be organized to make a device to feed carbons automatically into moving picture machines. The Kentucky Electric Company, Owensboro, will make the device under contract at the outset. Gus T. Brannon, Chicago, Ill., F. A. Ames, J. W. McCulloch, T. A. Pedley and others of Owensboro, Ky., are promoting the enterprise.

The Waller Mfg. Company, furniture manufacturer, Lexington, Ky., has purchased the former Lexington Automobile Company's plant and will make additions to increase its output.

The Paducah Clay Company has increased its capital from \$10,000 to \$100,000 and projects enlargements of its several clay mining operations. H. R. Lindsey, Luther Carson, Luke Durradell, Harry Clements and C. E. Jennings of Paducah, are stockholders. Several miles of railroad tracks will be constructed.

The Paducah & Illinois Railroad Company projects freight and passenger terminals at Paducah and has asked for a franchise.

Ashland, Ky., will receive bids until April 17 for a 100 hp. or over triple combination pumping fire engine of 750 gal. capacity up, with various fire fighting equipment items.

The John G. Duncan Company, 303 West Jackson Avenue, Knoxville, Tenn., is asking for dealers' prices on a 7 to 8 ton, 36-in. gage locomotive, rebuilt or second-hand, or user's price for immediate delivery, and jobbers' prices of hoisting engine without boiler, 8 x 10 double cylinder, double drum, and 8000 ft. of 1-in. used guy rope.

St. Louis

ST. LOUIS, Mo., April 10, 1916.

Machine-tool dealers report business limited only by their ability to deliver the equipment sought. Price is of little importance in comparison with delivery. While the pressure exerted by foreign demand has relaxed somewhat, domestic requirements are increasing at a rate that keeps the dealers in as great difficulties as ever. The prospects are for a continuance of the activity. New enterprises are being established more rapidly than equipment can be obtained, while established companies are pressing for additional equipment. The market is bare of both new and second-hand machinery.

F. C. Bretsnyder, of the Bell Oil Company, St. Louis, and others, are interested in an oil refinery which will be equipped across the river from the city with a capacity of about 500,000 bbl. annually. A site has been obtained, a building arranged for and machinery is now wanted.

The Manchester Silo Company, St. Louis, Mo., has been incorporated with a capital stock of \$12,000, by T. H. Slevert, J. C. Kell and John M. Schwaig, to manufacture silos.

The Overland Stores Company, St. Louis, Mo., will erect a four-story machine and repair shop. T. L. Hausmann is president.

The Harry L. Hussmann Refrigerator & Supply Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by Harry L. Hussmann, John Schulde, Charles S. Schann and Alfred J. Heyer, to manufacture refrigerators and butcher's supplies.

The National Sand Blast & Tuck Pointing Company, St. Louis, Mo., has been incorporated, with a capital stock of \$14,000, by John S. White, John J. Kelly and others.

The American Sealer Company, Kansas City, Mo., has been incorporated with a capital stock of \$15,000, by B. B. Bennett, G. W. Schnieder and R. B. Gordon, to manufacture sealing machines.

The Ozark Power & Water Company, Springfield, Mo., has plans for the installation of additional equipment in its hydroelectric plant to cost about \$300,000.

The Fort Smith Light & Power Company, Fort Smith, Ark., has plans for about \$50,000 of improvements to its electric plant.

The Twin City Pipe Line Company, Fort Smith, Ark., has been incorporated with a capital stock of \$150,000, by W. R. Martin, E. S. Creekmore, W. J. Echols and Thomas L. Dailey.

The Arkadelphia Milling Company, Arkadelphia, Ark., will equip a hardwood mill, of 35,000 ft. daily capacity, near Sparkman, Ark.

J. S. Emigh, Pine Bluff, Ark., will equip a sawmill at Varner, Ark., with a daily capacity of about 25,000 ft.

William Haas & Son, Pine Bluff, Ark., will equip a factory for the manufacture of shovel handles.

The machine shop of the Jonesboro, Lake City & Eastern Railroad, Jonesboro, Ark., which has been burned, with a loss of about \$10,000, will be replaced. L. C. Gaty is general manager.

The Eureka Mining Company, Spadra, Ark., has lost its power plant by fire. About \$5,000 of new equipment will be required.

The Beggs Custom Gin Company, Beggs, Okla., has been incorporated with a capital stock of \$10,000 by James B. Kelley, J. C. Moore and Al Pendleton.

The Burpo Gin Company, Madill, Okla., has been incorporated with a capital stock of \$14,500 by J. W. Burpo, H. M. Rice and James K. Ross.

Blackwell, Okla., will expend about \$10,000 on enlargement of its electric light and power plant. The waterworks plant will also be improved.

The Clinton Broom Company, Clinton, Okla., will equip a broom factory, three stories, 50 x 100 ft.

The Ardmore Auto Company, Ardmore, Okla., has been incorporated with a capital stock of \$10,000 by C. B. Sykes, D. C. Fitzgerald and C. F. Adams.

The Midland Valley Railroad, Muskogee, Okla., will erect railroad shops to cost about \$160,000. C. C. Kaighn is chief engineer.

A waterworks plant is to be equipped at Wellston, Okla. The board of trustees has charge of the work. Pumps and other machinery are wanted; bids due April 17.

The Municipal Excavator Company, Oklahoma City, Okla., is in the market for electric grinding machines.

T. M. Thornton, Hattiesburg, Miss., is reported in the market for wood veneer-making machinery, etc.

The American Machine & Auto Company, Crowley, La., will enlarge its plant.

Shreveport, La., has begun preparations for the equipment of a waterworks plant to cost \$1,200,000. John B. Hawley, Fort Worth, Tex., is consulting engineer.

The Swift Packing Company's plant at Alexandria, La., which has been burned, with a loss of about \$75,000, will be replaced.

R. G. Wieland, Audubon, Iowa, is reported in the market for a large amount of electrical equipment including gas engines, five generators, and other machinery, all of considerable capacity.

Birmingham

BIRMINGHAM, ALA., April 10, 1916.

A distinct revival in the demand for tools from the railroads features the wholesale machinery market. Otherwise business has been quieter than in several weeks. The lull is not significant, however, as inquiries indicate a steady demand for almost every class of apparatus, with sawmill and electrical appliances still leading. The machine tool demand cannot be met.

Birmingham Inter-Urban Development Company, composed of W. W. Shortridge, George B. Tarrant, H. E. McCormack and others, plans building a 40-mile electric freight and passenger car line from Birmingham to Jasper.

The J. A. Kelley Mfg. Company, Dublin, Ga., will install machinery to manufacture hickory ax handles, etc.

The Atlanta Pigment & Chemical Company, Atlanta, Ga., capital stock \$100,000, has been incorporated by J. S. Brogden and others, to manufacture chemicals and dyestuffs.

The Southern Cotton Oil Company, Columbus, Ga., will expend \$30,000 improving its huller and linter departments.

Chandler & Campbell, Chattanooga, have been awarded contract for building a compress at Savannah, Ga., for the Savannah Warehouse & Compress Company. Col. G. A. Gordon, Savannah, is in charge.

E. T. Roux & Son, Plant City, Fla., have purchased 35,000 acres of timber land and will build a sawmill, etc., at a cost of \$75,000 to \$100,000.

The Florala Sawmill Company, Paxton, Fla., will erect a \$25,000 structure to replace its plant recently burned.

The Middleton Warehouse & Compress Company, Charleston, S. C., will build a compress. Charles F. Middleton is president.

C. C. Coddington, Charlotte, N. C., and others, are interested in the establishment of a corporation capitalized at \$500,000 for the manufacture of automobile tires.

The Co-operative Ice Company, Miami, Fla., capital stock \$60,000, has been incorporated by R. H. Pierce, Miami, and others, to build an ice factory.

San Francisco

SAN FRANCISCO, CAL., April 4, 1916.

Some inquiries for machine tools, from which business was expected, have been withdrawn; but the market continues quite active. Those who are able to offer reasonably early delivery have booked a very satisfactory business, consisting mainly of large single tools, while several large lists are expected shortly. Buying is no longer limited to any particular lines, though the greatest activity is among the larger shops. The principal railroads are buying steadily. With the increasing magnitude of operations, many manufacturers are giving more attention to economy, and installing more automatic and somewhat specialized tools. Deliveries in several lines are easing up a little. The demand for miscellaneous machinery is exceptionally active. Mining and smelting interests continue actively in the market, and logging machinery receives more attention than for many months. Agricultural machinery is in strong demand, and many boilers and special machines are being purchased by packers.

Oil well equipment is active, both locally and for export. California has furnished tools, machinery and technical knowledge for the development of Japan's oil fields, and according to prominent Japanese now in this country a large amount of machinery is still to be bought.

A large cargo of general machinery left this port April 3 for Vladivostok.

The Premier Canning Machinery Company, recently organized by Edward C. Dee and J. A. Landsberger, is equipping a plant at 1001 Twenty-second Avenue, Oakland.

It is announced that the Ford Motor Company will build an assembling plant at Salt Lake City, Utah. It has just let a contract for another building for its San Francisco plant.

The Chevrolet Motor Company has let a contract for a

three-story concrete automobile assembling plant in Oakland, Cal.

The Western Casket Company is preparing to build a new factory on Tenth Street, near Webster, Oakland, Cal.

The Moore & Scott Iron Works has its new machine shop at the Oakland shipbuilding plant about complete, and has taken a new contract for an oil tank steamer to cost \$1,250,000.

The Goldfield Consolidated Mining Company, Goldfield, Nev., has been trying out a 50-ton flotation plant, and it is now announced that a plant of 1000 tons daily capacity will be installed.

The Enterprise Machine Works, Santa Cruz, Cal., is putting up a new building for its shop and foundry.

The Kleiber Truck Company, San Francisco, has plans for a new motor truck assembling plant to be built at Folsom and Eleventh streets.

Los Angeles County, Cal., is taking bids on an engine generator set for the county hospital.

The Mechanical Installation Company, 181 Second Street, is moving its shop to larger quarters at 115 Main Street.

The Industrial Service Company, Modesto, Cal., is preparing to enlarge its shop and add a foundry to take up the manufacture of mining specialties in a larger way.

The Johnson Gear Company, San Francisco, is putting up a new shop building on Ritch Street near Folsom.

Orange, Cal., is taking bids for a cross compound two-stage air compressor.

The Pacific Northwest

SEATTLE, April 4, 1916.

The optimism prevalent here for the past few months is daily becoming stronger. As an instance of the steady improvement in all lines, the Chicago, Milwaukee & St. Paul carshops in Tacoma have placed 1000 employees in the plant on extra time, and the 500 men employed in the locomotive department have had their day increased from eight to nine hours. Officials of the road state that it has had more business thus far in 1916 than at any time since it extended to Puget Sound seven years ago. Reports from the large lumber mills show that practically every plant has enough orders on hand to keep it running long shifts for many months to come. The fine weather of the past month has permitted the logging camps to resume operations, and the log shortage is now well in hand.

An entirely unprecedented era of prosperity has come to the shipbuilding plants in the Northwest. Eliminating the tremendous factor of ocean-going ships, which is keeping the larger plants active day and night, the smaller and medium size shipbuilding plants are rushed to the limit with orders. These plants depend for their work on the cannery and fishing fleets, pleasure vessels, etc., and many of them now have waiting lists.

An order has been placed with Pacific coast dealers by representatives of France and Italy for 400,000 cases of 28,000,000 lb. of pink salmon, to be filled by Portland, Seattle and San Francisco packers.

The Oregon-Washington Railroad & Navigation Company, Portland, Ore., has authorized the expenditure of \$3,650,000, in addition to the normal improvements, according to J. D. Farrell, president. Work on a number of the projects provided for has been ordered. Detailed expenditures include shop improvements and tools, Albina, \$75,000.

The Oregon City Iron Works, Oregon City, Ore., plans the expenditure of \$10,000 in general improvements.

The Bunker Hill & Sullivan Mining Company, with properties and mills at Kellogg, Idaho, has placed an order with the Traylor Engineering Company, Allentown, Pa., for equipment and machinery for its new lead smelter which will cost \$1,000,000. Plans provide for three furnaces, with 300 tons daily capacity.

The Anaconda Copper Mining Company, Great Falls, Mont., has begun work on the foundations of its smelting plant to be erected in Great Falls at a cost of \$2,000,000. The owners are doing the work under the day labor plan. Over 1500 tons of steel will be required.

The Reindeer-Queen, Carney Copper and Carbonate Hill Mining companies, all of Wallace, Idaho, have reached an agreement whereby the Reindeer-Queen Company will install a power plant to supply electric energy for the three companies. All equipment will be motor-driven.

The Clear Fir Lumber Company, Tacoma, Wash., recently incorporated, has taken out permit for erection of a sawmill in Tacoma to cost \$125,000, with a capacity of 100,000 ft. per day. The nucleus of the plant will be the old Snyder Brothers mill, which will be completely rebuilt and new motor-driven machinery installed.

C. C. Doud, secretary of the Nickerson McFarland Machinery Company, Tacoma, Wash., is at the head of a syndicate which purposes to erect a shipbuilding plant in Tacoma, for the construction of ten lumber schooners. The vessels will each cost about \$80,000, will be 225 ft. long, equipped with Diesel auxiliary engines, with capacity of 1,500,000 ft. of lumber each.

It is announced that the Oregon Iron & Steel Company's plant at Oswego, Ore., which has been closed for more than a year, will resume operations within a few days. It employs 60 men.

The new Alaska-Pacific Navigation Company, Seattle, has started work on a shipbuilding plant on the West Waterway, where it will construct wooden hull motorships, to cost \$150,000 each, for its own use as passenger and freight carriers.

The Standard Furniture Company, Seattle, has recently purchased a site, 120 x 270 ft., at Fourth Avenue South and Walker Street, on which will be erected a factory for the manufacture of mattresses, springs and furniture.

R. E. Ruffschnidt and C. J. Dugan, Portland, Ore., have recently been donated a site in Bend, Ore., on which an iron foundry will be erected. The owners have been associated with the Independent Foundry Company, Portland. Some equipment is already on hand in Portland, waiting for the erection of the building, to be 40 x 100 ft.

The Landes Implement & Machinery Company has announced its intentions of locating a warehouse and distributing station in Pocatello, Idaho.

The Constitution Mining & Milling Company, Spokane, Wash., plans the construction of an electrolytic plant in Spokane for the treatment of zinc ores. The plant will handle 100 tons daily, and will cost \$425,000. Judge George Turner, president of the company, states that about 6000 hp. will be required to operate the plant.

The Shelton Electric Company, Shelton, Wash., has been taken over by Charles A. Harmony, formerly city electrician of Centralia. The name will be changed to the Shelton Light & Power Company, and improvements are planned.

The Elliott Bay Yacht & Engine Company, Seattle, is closing negotiations for a site on which it proposes to erect a shipbuilding plant on the West Waterway at a cost of \$250,000, where it will construct ocean-going vessels.

The Pullman Seed Treating Company, Pullman, Wash., has been organized by Harley Jackson, M. C. True, E. P. Deering and A. E. Walker, to erect a small factory, to manufacture a new machine for treating grain.

The Pacific Machine Shop & Mfg. Company, Seattle, Wash., has been organized with a capital of \$2,500 by Allan Cunningham and G. E. Steiner.

The Farmers Elevator Company, Condon, Ore., has commissioned H. C. Dittrich, architect, Worcester Building, to prepare plans for a reinforced concrete elevator which will handle 1000 bu. per hr., and will be equipped with automatic scales and its own electric plant.

Texas

AUSTIN, TEX., April 8, 1916.

Splendid rains have fallen all over Texas and crop prospects are greatly enhanced. The machinery and tool trade is in satisfactory condition.

The Texas City Handle Company, Texas City, will enlarge its plant for the purpose of manufacturing chairs and other furniture.

The Denver Boiler & Iron Works is negotiating with the manufacturing committee of the chamber of commerce, El Paso, with the view of constructing a foundry in that city.

The Houston Pneumatic Puncture Proof Wheel Company, Houston, has increased its capital stock from \$25,000 to \$100,000 to provide additional funds for enlarging its plant and business.

The Sacramento Mountain Lumber Company, Alamogordo, N. M., will place an order soon for \$50,000 worth of logging machinery. It is rebuilding the sawmill here and increasing its capacity to 135,000 ft. daily. F. J. Williams is general manager.

The Atchison, Topeka & Santa Fe Railroad will build a 100-ton mechanical coal chute, a five-stall roundhouse and a cinderpit at Carlsbad, N. M.

At a recent election at Clovis, N. M., \$35,000 bonds were voted to be used in extending the municipal waterworks system, etc.

An issue of \$50,000 bonds has been voted at Cimarron, N. M., the proceeds to be used in the construction of a municipal waterworks plant.

A municipal waterworks plant will be built at Springer, N. M., an issue of \$50,000 bonds having been voted for the purpose.

Canada

TORONTO, April 8, 1916.

The Canadian Northern Railway office at Winnipeg, Man., announces that M. H. McLeod, general manager, is making arrangements for one of the largest terminal undertakings in Canada, entailing an expenditure of nearly \$10,000,000. One of the developments will be a ferry service between Vancouver Island and the mainland. Large boats will be constructed capable of carrying an entire train for service between Port Mann, B. C., and Vancouver Island. A slip will be built at Port Mann for loading cars on these boats. Other proposed works at Port Mann include the construction of two new turntables, the installation of machinery in a machine shop, and the erection of a 1000-ton icehouse, etc. The company will also commence at once on the erection of a shipping dock at Port Arthur, Ont. J. R. Nelson is local superintendent.

Whitfield & Co., 33 Sherbourne Street, Toronto, are erecting a machine shop at a cost of \$12,000.

A. R. Clarke & Co., 633 Eastern Avenue, Toronto, Ont., leather manufacturers, are receiving bids for the erection of a work shop of steel, concrete and brick, to cost \$30,000. They will also build a galvanized iron and frame enameling shop at a cost of \$5,400.

C. Hedley Williston, 504 Robie Street, Halifax, is calling for bids for the completion of a foundry at Dartmouth, N. S., to cost \$16,000, for the Williston Steel Foundry Company.

The Miner Lumber Company, Coristine Building, Montreal, is in the market for wood-working lathes.

The Buffalo Mines, Cobalt, Ont., will shortly be in the market for motors for running a day mill and compressor at Kirkland Lake, Ont.

The R. A. P. Syndicate, Boston Creek, Ont., will shortly install a 100-hp. motor at its plant. John Papassimakos is manager.

The Standard Chemical Iron & Lumber Company's plant at Fassett, Que., was destroyed by fire with a loss of \$75,000. The company will rebuild.

The Halifax Electric Tramway Company, Lower Water Street, Halifax, is calling for bids for the construction of a by-products building, cold storage building of steel and brick, and for elevating and conveying machinery for its new gas plant. H. R. Barrett is engineer.

The Dominion Atlantic Railway, Kentville, N. S., will build an engine house at Middleton, N. S. G. E. Graham is general manager.

Sault Ste. Marie, Ont., will construct a power and pumping station on Gore Street to cost \$7,500. A. E. Pickering is engineer.

The R. Bell & Son Company, Ltd., St. George, Ont., will rebuild its factory recently destroyed by fire at a cost of \$5,000.

The Trussed Wall & Concrete Company, Saskatoon, Sask., will erect a factory at Sutherland, Sask. A. C. Gohn is president.

The Skedden Brush Company, 130 King Street, North, Hamilton, Ont., will commence the erection of a factory to cost about \$8,000.

The Hull Iron & Steel Company, Ltd., Montcalm Street, Hull, Que., will build an addition to its plant to cost \$4,500.

The Dominion Safe & Vault Company, Farnham, Que., is contemplating erecting a plant at Niagara Falls, Ont., for the manufacturing of safes, vaults, etc. H. J. Fuller is president.

W. Ellis has purchased the controlling interest in the Maple Leaf Auto & Garage Supply Company, Hamilton, and will erect a plant on Barton Street for the manufacture of metal specialties, automobile parts and boat supplies, etc. H. J. Wise is manager.

The Perfect Machinery Company, Galt, Ont., will erect a new plant on Manchester Survey at a cost of \$5,000. S. L. Clarke is a stockholder.

New electrically driven equipment will be installed in the pumping plant at Barrie, Ont. J. F. Lang is engineer.

The City Council, Sault Ste. Marie, Ont., is considering the construction of a waterworks plant and system to cost \$300,000. R. G. Campbell is clerk.

Bids will be called about May 1 for the completion of the Parliament Building at Winnipeg, Man., at a cost of \$1,000,000. Simons & Paddington, Parliament Building, are the architects.

D. W. Davies, manager of the Canada Iron Foundries, Fort William, Ont., announces that he plans to open the pipe foundry of the company April 15. This will mean that the entire plant will be running to full capacity.

The Quebec Railway, Light, Heat & Power Company, Ste. Anne de Beaupre, Que., is now building its own cars at its

workshops. At the present time it is getting 2000 hp. from Seven Falls, which may be increased shortly to 10,000 hp., and ultimately 20,000 hp.

Penmans, Ltd., Paris, Ont., will shortly commence work on the erection of a factory at Brantford, Ont., to cost \$15,000.

The Dominion Ford Company, Russell Avenue, St. Catharines, Ont., will build a factory there. T. H. Wiley, 128 St. Paul Street, is receiving bids for the erection of the plant, which will cost \$20,000.

James Carr, Alliston, Ont., is in the market for a pony planer, 18 or 20 in.

Saskatoon, Sask., will install a motor converter to cost \$16,000, boiler feed pumps to cost \$2,000, etc. J. H. Archibald is city engineer.

Weyburn, Sask., passed a by-law to grant \$35,000 for extensions to the electric light plant. E. H. Phillips is city clerk.

The Blystone Mfg. Company, Cambridge Springs, Pa., has purchased a site on Fourth Avenue, Niagara Falls, Ont., and will commence within the next few weeks the erection of a plant for the manufacture of concrete machinery, tools, etc.

Boyd's, Ltd., has secured a site 400 x 1100 ft., between Kyle and Queen streets, Port Moody, B. C., on which it will build a shipbuilding plant to cost \$200,000. Foundations are provided for three launching slips, constructed to afford facilities for erecting two ships on each simultaneously. On these ways it will at the outset build ships of 2000 tons each. The slips will be located in such a manner as to provide for the construction of steel vessels up to 10,000 tons. The plant will comprise a steel foundry, machine shop and wood-working plant. Two railways will be provided, one to handle bottoms up to 1000 tons and the other up to 3000 tons, on which the company will repair its own vessels as well as carry on a general repair business. Capt. Harry Mowatt will be manager.

The Mecca Specialties Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by George W. MacNeill, Cedarvale, Ont.; David B. Goodman, 32 Adelaide Street, East; Arthur A. Macdonald, 110 St. Vincent Street, and others to manufacture engines, motors, vehicles, etc.

The Hall Motors, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Robert H. Van Kempen, 34 Grace Street; Adam B. Mitchell, 111 Tyndall Avenue; William M. Hall, 17 Queen Street, East, and others to manufacture motors, engines, automobiles, motor cycles, etc.

The Plaola Piano Company, Ltd., Oshawa, Ont., has been incorporated with a capital stock of \$40,000, by John Leckie, 77 Wellington Street West; Donald R. Hossack, 30 Chestnut Park; Lorne A. Lillico and others, to manufacture musical instruments, etc.

The Iron Works, Ltd., Owen Sound, Ont., has been incorporated with a capital stock of \$96,000 by Francis H. Kilbourn, John McEwen, Samuel A. McDougall and others, to manufacture engines, boilers, machinery, tools, etc.

The Dominion Casket Company, Ltd., Guelph, Ont., has been incorporated with a capital stock of \$100,000 by William Pears, Keele Street, York Township, Ont.; William G. Whitehead, James M. Arnold and others, to manufacture caskets, vaults, vehicles, etc.

The Gibson Mfg. Company, Ltd., Guelph, Ont., has been incorporated with a capital stock of \$150,000, by Edward Bareman, Walter E. Buckingham, Stanley Koch and others, to manufacture gasoline engines, machinery, tools, implements, etc.

The Pierrefonds Electric Company, Ltd., Saint-Genevieve de Pierrefonds, Que., has been incorporated with a capital stock of \$50,000 by Joseph Bernard, George St. Germain, Napoleon Nantel and others, all of Montreal, Que.

The Canadian China Clay Company, Ltd., Montreal, has been incorporated with a capital stock of \$1,500,000 by Francis G. Bush, George R. Drennan, Michael J. O'Brien and others to manufacture china clay products, etc.

The Fowler Machine Works, Ltd., Vancouver, B. C., has been incorporated with a capital stock of \$10,000 to manufacture machinery, tools, etc.

William Lee, Ltd., Montreal, has been incorporated with a capital stock of \$25,000 by Walter S. Johnson, Gerald A. Coughlin, Hugh Wylie and others to manufacture pianos, etc.

The Great Lakes Power Company, Ltd., Sault Ste. Marie, Ont., has been incorporated with a capital stock of \$2,600,000 by John A. McPhail, William E. Brown, Kenneth M. Wright and others, to build and operate electric light, heat and power plants. It has come to an agreement with the Algoma Steel Corporation, whereby it will take over the electric plant recently operated by that company and will spend about \$3,000,000 on improvements and extensions to the plant.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

SPECIAL MANUFACTURING CONTRACTS.—Although it is a general rule of law that a surety for the performance of a contract is discharged from liability on a modification of the principal contract without his consent, a company which guaranteed performance of a contract for manufacture of appliances was not discharged by minor changes in the designs or in the contract, although made without its consent. Where the first instalment of machines manufactured under a single contract failed to work properly, the buyer was entitled to rescind the entire contract and refuse to accept the remaining instalments contracted for. (Kentucky Court of Appeals, *United States Fidelity & Guaranty Company vs. Travelers' Insurance Machine Company*, 180 Southwestern Reporter, 815.)

LOANS TO CORPORATIONS.—One who lends money to a business corporation is under no obligation to see that it is applied to valid corporate use, it being sufficient that the funds be paid to an authorized officer; but the corporation may repudiate a loan secured by one of its officers for private use, if the lender knew that the funds were to be so used. (Minnesota Supreme Court, *Gross Iron Ore Company vs. Paulle*, 156 Northwestern Reporter, 268.)

EMPLOYER'S DUTY TO EMPLOYEES.—The operator of an industrial plant being bound to furnish his employees with reasonably safe means of entrance to and exit from the places where they are employed, a steel company may be found to have been guilty of negligence rendering it liable for injury to an employee on a night shift where an excavation adjacent to an entrance through which he passed was left unguarded, if his fall into the excavation was not due to his own carelessness. (California Supreme Court, *Moore vs. Pacific Coast Steel Company*, 153 Pacific Reporter, 912.)

CONTRIBUTORY NEGLIGENCE OF INJURED EMPLOYEE.—An employee in a steel company's mill cannot recover for injury sustained through a dangerous condition existing in the plant, if the injury resulted from his voluntary choice of a way of doing his work which he knew was dangerous, whereas a safe way was open to him, but an employee does not assume risks arising from his employer's omission to conform to a statutory safety requirement. (Indiana Supreme Court, *King vs. Inland Steel Company*, 110 Northeastern Reporter, 62.)

DUTY TO WARN FOUNDRY EMPLOYEES.—A foundry company may be found to have been negligent in failing to warn an employee against the danger of an explosion while assisting in pouring molten metal into green cores, rendering the company liable for injury resulting to the employee, where it appears that he was comparatively inexperienced in that line of work. (United States Circuit Court of Appeals, Sixth Circuit, *Oliphant vs. Casey-Hedges Company*, 228 Federal Reporter, 636.)

MEASURE OF DAMAGES FOR BUYER'S BREACH OF CONTRACT.—When the subject of a contract of sale is staple goods or machinery which has a ready sale in the market, the seller's damages for the buyer's refusal to accept delivery are to be measured by the excess of the contract price above the market value of the property, regardless of whether the property had been carried in stock by the seller or was specially manufactured for the buyer. (United States Circuit Court of Appeals, Eighth Circuit, *General Electric Company vs. Manhattan City & Interurban Railway Company*, 226 Federal Reporter, 173.)

WARRANTY OF GOODS BY SALESMEN.—One buying goods from a salesman is entitled to rely on the latter's implied authority to warrant the quality of the things sold, in the absence of any known limitation on the salesman's authority as the seller's employee. No particular word or form of expression is necessary to create a warranty, nor need the word "warranty" be used. If a representation is positive and relates to a matter of fact, as distinguished from a mere expression of opinion, and the buyer relies upon it as being true in making the purchase, the representation will

constitute an actionable warranty. (Oklahoma Supreme Court, *St. Louis Cordage Mills vs. Western Supply Company*, 154 Pacific Reporter, 646.)

ASSUMPTION OF RISK BY EMPLOYEE.—When an employee complains to his foreman of defects in tools used by him but receives no assurance that repairs will be made, he assumes the risk involved in their continued use. (Pennsylvania Supreme Court, *Wochner vs. Pennsylvania Engineering Works*, 96 Atlantic Reporter, 471.)

SCOPE OF NEW JERSEY WORKMEN'S COMPENSATION ACT.—The New Jersey workmen's compensation act does not render an employer liable for injury to an employee as a result of "horseplay" of other employees in which the injured man took part. (New Jersey Court of Errors and Appeals, *Hulley vs. Moosbrugger*, 95 Atlantic Reporter, 1007.)

VIOLATION OF FACTORY ACT REQUIREMENTS.—An employee injured while adjusting a defective die on a metal-cutting machine is not precluded from recovering damages on theory of assumption of the risk, if he was induced to remain at work under the employer's promise to repair the defective condition, or if the injury resulted from the employer's omission to provide a practicable guard as required by the State factory act. (Indiana Supreme Court, *Doan vs. E. C. Atkins & Co.*, 111 Northeastern Reporter, 312.)

DUTY TO GUARD CUTTING MACHINES.—The Missouri statute which requires employers to safeguard machinery, etc., when so situated as to be dangerous includes machines used in cutting metal, although operated by foot power, and an employee injured through omission of his employer to safeguard such a machine is entitled to recover damages. (St. Louis Court of Appeals, *Corry vs. Majestic Mfg. Company*, 181 Southwestern Reporter, 1076.)

STATUS OF EMPLOYEES LENT TO THIRD PERSON.—Where an employer lends a workman to a third person, as where a seller of machinery does not agree to install it but lends a machinist for that purpose, the employee, for anything done in the particular service, must be deemed to be the employee of the third person, although he remains the general employee of the person who lent him; and, if the workman receives an injury in such special employment through negligence of an employee of the person to whom the particular workman has been so specially lent, he cannot recover therefor. The test to determine the status of the employee is whether in the particular service he remains subject to the control of his general employer or becomes subject to that of the person to whom he is lent. (Texas Court of Civil Appeals, *Fink vs. Brown*, 183 Southwestern Reporter, 46.)

WHEN SELLER'S WARRANTY IS NOT ACTIONABLE.—A buyer of machinery has no cause of action against the seller for breach of warranty concerning the machinery unless the buyer relied on the warranty at the time the purchase was made, nor is there any right to recover damages on account of a defect in the machine warranted against by the seller, if the buyer fails to give notice thereof to the seller as required by the contract as a basis for enabling the seller to remedy the defective condition. (Texas Court of Civil Appeals, *Wilson vs. Avery Company*, 182 Southwestern Reporter, 884.)

TIME FOR SHIPMENT BY SELLER—EFFECT OF TRADE CUSTOMS—SELLING FOR BUYER'S ACCOUNT.—A seller of pig iron who fails to tender delivery within the time required by his contract, without showing legal excuse for such failure, cannot recover damages on account of the buyer's refusal to accept a tardy delivery. A contract to sell goods, clearly showing by express terms an agreement as to time and manner for delivery, cannot be controlled by a conflicting trade custom. When a seller sues a buyer for the excess of the price agreed to be paid by the latter for goods above the price obtained on a resale to a third person after the buyer refused to accept delivery, the seller must show that notice of intention to make the resale was given the buyer. (Indiana Appellate Court, *Napier Iron Works vs. Caldwell & Drake Iron Works*, 110 Northeastern Reporter, 714.)

ESTABLISH

W

I N the past Amesbury has been known for its carriage industry. What was the industry like in those times? The industry today is devoted to the production of products of the finest quality of wooden coach.

In Amesbury, the use of aluminum in construction has developed which has made possible new departures in savings through the economical cutting of patterns and actual labor well. Ox welding plays an important part in the new type of construction at the Amesbury Company.



Fig. 1—The